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No. 20

UNITED STATES SHIP BUILDING CO.'S SECURITIES.

A syndicate is forming to take over the securities of the United States Ship Building Co. which have been in the possession of the Trust Company of the Republic. The face value of these securities, bonds and stock, it is reported on good authority, amount to $4,000,000. Mr. George R. Sheldon is heading a syndicate to take over the securities. Mr. Sheldon has not been connected with the Trust Company of the Republic or the United States Ship Building Co. There was an original underwriting syndicate that underwrote the bonds of the United States Ship Building Co. at 90, the underwriters getting as a bonus 25 per cent. of the amount of their subscription in the preferred stock and 25 per cent. in the common stock. This original syndicate has been closed up, it is understood, excepting so far as the Trust Company of the Republic is concerned. The syndicate which will take over the big block of ship building securities from the trust company is an entirely new syndicate which is understood to include some of the strongest financial interests in New York. The following statement was given out on the authority of the officers of the trust company:

"The securities of the United States Ship Building Co. were underwritten abroad and in the United States under an underwriting agreement, which provided that the underwriting syndicate should last until July 25, 1903. The Trust Company of the Republic is the syndicate manager of this syndicate. Certain of the underwriters in France have so far failed to pay their subscription, but this did not affect the organization of the United States Ship Building Co., and all the properties included in that combination were transferred and their capital stocks are held by the ship building company, and all the cash needed for the transaction was furnished and the company began business with $1,500,000 paid in its treasury for working capital and $1,500,000 of its bonds to be sold for future needs. The company is in splendid condition and doing a handsome business. On the French underwriting which was not taken up loans were made in this country by various institutions, and some loans were made on this underwriting by the Trust Company of the Republic. Comparatively recently a syndicate or pool was formed, of which George R. Sheldon is the manager, and associated with him is the North American Co. This pool, which is composed of some of the strongest people in the street, has purchased all these securities that originally would have gone to France, and is paying off the amounts borrowed on them. The payment of the Trust Company of the Republic of the loans which it made on some of these securities relieves it of its interest in them, but does not affect its position of syndicate manager, nor its profit as such. This operation which was contemplated in the beginning, but deferred on account of the continuance of the coal strike and high money, has been completed and put the trust company in a strong situation."

ANNUAL REPORT OF REAR ADMIRAL BRADFORD.

Admiral Bradford, chief of the bureau of equipment, again protests in his annual report against the action of the department in substituting a naval constructor for a line officer in ship building works. A naval constructor, he says, is a non-seagoing officer. Inquiries as to the custom of the merchant marine in this matter, the report says, shows that the construction of merchant ships generally is supervised by the most experienced master mariner and chief engineer in the employ of the owner. It is an anomaly to build a ship and prepare her for sea under the supervision of a landsman. The report does not touch on the question of additional coaling stations or of wireless telegraphy. The total amount of coal purchased during the year was 382,040 tons at an average cost of $5.81 per ton, against $7.01 last year. This is the lowest price paid for coal since 1898, when the average was $4.68. The amount used was 18 per cent. larger than the preceding year. The amount used for steaming purposes has increased more than five times during the past ten years. The report notes the gratifying fact that foreign coal purchased decreased 16 per cent., while the amount of domestic coal used increased 34 per cent. Special attention is called to the fact that 48 per cent. of the entire coal consumption was for auxiliary purposes. Exhaustive tests were made during the early part of the year by the torpedo boat flotilla at Norfolk of various kinds of Virginia coal to determine which was best adapted for the use of torpedo boats. The result showed little difference when the coal was carefully selected.

Admiral Bradford renews his recommendation for the construction of two large steam colliers capable of carrying 10,000 tons of coal as cargo, and 1,000 tons in bunkers, with accommodations for a naval personnel and liberal amount of stores and a secondary battery. Such ships, the report says, would be very useful in peace or war. They should be capable of 12 knots when loaded and would be economical on long voyages at a speed of 8 or 9 knots.

TWO SUBMARINES READY FOR TRIAL.

The navy department has been notified that two submarine boats are ready for trial. Many improvements have been made in the new boats over the Holland, the only submarine boat the navy possesses, and the trials are calculated to demonstrate the superiority of the Adder and Moccasin. The new vessels are 63-ft. 4-in. in length, compared to 53 ft. 10 in. for the Holland. In diameter they are 11 ft. 9 in., against 10 ft. 3 in., and they have a displacement of 122 tons submerged, against 74 tons for the Holland. The latter vessel makes 6 knots on the surface and 5½ submerged with a gas engine of 50 H. P. for surface running and a 50-H. P. electric motor for propulsion when submerged. The new vessels will have gas engines of 160 H. P. and an electric motor of 70 H. P., while its batteries will have a capacity of 1,940 ampere hours, more than double the 900 ampere hours of the Holland's batteries. Three Whitehead torpedoes are carried by the Holland and five by the Moccasin and Adder. England has adopted the American model and has ordered as many as the United States, and H. O. Arnold Foster, parliamentary secretary to the British admiralty, recently declared in outlining the naval program for Great Britain that the construction of submarine vessels was to be taken up with energy, indicating that the trials of the English boats had been entirely satisfactory. The smaller countries of the world are turning to submarine boats. Norway has adopted the American model and Portugal and Holland are negotiating for American-built submarines. Brazil, Venezuela, and other smaller countries are awaiting the results of the trials. The navy department permitted inspection of the Holland, but a change of policy has been inaugurated in this regard.

In general design the new vessels follow the Holland. Without sacrificing handiness, the increase in dimensions and displacement has enabled the contractors to provide much more roomy vessels, with an improved armament and a very considerable increase in speed and radii of action. The extra power provided allows the batteries of air flasks to be recharged while proceeding at a speed of 6 knots on the surface. The boats are to be required to make sixteen runs on the surface under the gas engine only, over a one-mile course, half the runs with the tide and half against. The average speed of 8 knots an hour must be attained on these runs. Awash the boats will make six runs of a mile with the tide and an equal number against it, the average speed to equal 7 knots, the gas engine only being used.

In a completely submerged condition the boat will carry the crew and two observers from the trial board, and no portion of the boat is to be exposed, but a light mast shall be carried to show above the surface so the trial board can observe the times of passing the ranges. On these trials the boats will make four runs for each of the three different speeds over a course of one-half nautical mile in length, two with and two against the tide, the average speed to equal 7 knots. Over a course of 10 knots the vessels will be required to make 8 knots an hour on the surface and 7 knots an hour awash.

In the torpedo trials the vessel will be required to run 2 miles under water and at the finish discharge a torpedo which will strike a target 150 ft. long by 15 ft. deep, placed across the course, representing the vitals of a battleship. The vessel is not to rise for observations more than three times from the time of starting until the discharge of the torpedo for the duration of each period of observation not to exceed one minute.

The endurance trials will consist of a surface run of twelve hours' duration at full speed of 8 knots under the gasoline engine, and one of three hours hermetically sealed under the electric motor, at 7 knots an hour.

WORK AT THE TRIGG SHIP YARD.

Richmond, Va., Nov. 12.—Work is progressing rapidly at the yard of the W. R. Trigg Co. The cruiser Galveston will be launched early in December, though the exact date has not yet been set. The boilers, auxiliary machinery and much of the piping are already in place. The engines will be ready to go aboard as soon as the cruiser is launched. The revenue cutter Mohawk will be ready for a dock trial during the present week. The official speed trial is expected to take place in December. The suction dredge Benyaurd is about 70 per cent. completed. During the month the work of plating the dredge has been progressing satisfactorily. Her machinery is about completed. The oil steamer Capt. A. F. Lucas is being plated and the machinery for her is being erected in the shop. The tugs Bristol and Chester will be launched in about six weeks. The machinery will be ready to be installed as soon as the tugs are launched. The keel has been laid for the tug Cape Charles and the machinery is well advanced.

SHIPS AND SHIPPING IN SCOTLAND.

Glasgow, Nov. 4.—The admiralty has closed contracts for the four new scouts to which I have referred in previous letters. One is to be built by the Fairfield company here, one by Laird Bros. of Birkenhead, one by the Vickers company at Barrow and one by the Armstrong company, Elswick. The vessels are to have engines of 17,000 H. P., to develop a speed of 25½ knots in sea-going trim.

In the ship building world there is little doing in the way of ordering new mercantile craft. Mr. D. C. Cummings, general secretary of the Boilermakers' & Iron Ship Builders' Society, in his October report, states that there have been recently large increases on the out-of-work Union lists—an increase of 1,560 idle, of seventy-four on sick benefit, and of sixteen on superannuation. No one, he says, can shut his eyes to the seriousness of the position, and affect to deny that the expected depression has at last descended on the industry. Certainly September is always a slack month for repairs, but the increase in repair work that can be reasonably expected in the near future may be counterbalanced by the slackening that usually takes place on new work in the closing months of the year. The prospects for the coming winter cannot be said to be hopeful. In this connection it may be mentioned that the trade unions are again trying to get the Clyde employers to start a system of weekly, instead of fortnightly, pays. Mr. James Gibb, secretary of the committee which is endeavoring to obtain weekly payment of wages to Clyde ship yard workers, has sent to Mr. Thomas Biggart, secretary of the Clyde Ship Builders' Association and of the Northwest Ship Builders' Federation a circular to that effect. But it is no use. The weekly pay system was tried under agreement two or three years ago and was a dismal failure. The employers will not renew it.

NEW ARMORED CRUISERS.

Another armored cruiser is to be built by contract and one at the dock yards, of a type the chief feature of which will be in the armament. These new vessels are the first designed by Mr. Philip Watts since he succeeded Sir William White as chief constructor, and mark an important departure from recent practice. They will be the most powerfully armed cruisers of high speed in the service, or, indeed in any navy. The new cruisers will have a central citadel, and all of the big guns will be concentrated within this area, so that it will be possible to reduce the extent of armor protection necessary. The armor will extend to the upper deck, and there will be no casemates as in recent ships. Centrally placed at the forward and after ends of the citadel there will be a 9.2-in. gun, and at each of the four corners of the citadel there will be another, making six of these 22-ton guns firing a 350-lb. shot with a total muzzle energy of 18,400-ft. tons. No cruiser in the service has more than two of these guns, while the early County cruisers had nothing heavier than the 6-in. and the later Devonshires have only two 7.5-in. guns. Three of the guns are available for a chasing fight and four of them for broadside work. The ships will also have eight 6-in. quick-firers, two of which will also be fitted for bow fire. The Drake class have two 9.2-in. and sixteen 6-in. quick-firers, the Cressy class two 9.2-in. and twelve 6-in. quick-firers, the County class fourteen 6-in. and the Devonshire two 7.5-in. and ten 6-in. quick-firers.

Two third-class cruisers, to be built by tender, are to be practically repeats of the Amethyst and Topaz, one of which was ordered six months ago from Sir W. G. Armstrong, Whitworth & Co., and is to be fitted with Parsons' steam turbine; while the other was ordered from Messrs. Laird of Birkenhead. These vessels are developments of the vessels of the Pelorus class, their characteristics being lightness and speed. They are 360 ft. long, 40-ft. beam, with a mean load draught of 14 ft. 6 in.; and they displace 3,000 tons, of which 1,650 tons is due to the hull. The engines are to give a power of 9,800-I. H. P., the express water-tube boilers being then worked under forced draft. The speed under these conditions will be 21¾ knots, while under natural draft the power will be 7,000-I. H. P. and the speed will be 20 knots. The vessels will carry 300 tons of coal. They are unprotected excepting for a light armored deck. Their armament includes twelve 4-in. quick-firers and eight 3-pounder guns.

TO EXPLORE THE SOUTH POLAR REGION.

Among the countless interesting and remarkable vessels which have left the Clyde for active service of some sort, none is more interesting than the Scotia, which the Scottish National Antarctic Expedition are about starting to explore the South Polar region. Three expeditions—German, Swedish and British—are at present exploring the regions of the South Pole, and the Scotia sets sail this week under the leadership of Mr. Wm. S. Bruce. The ship was formerly a Norwegian whaler named the Hekla, but during the past seven or eight months she has been so thoroughly overhauled on the Clyde that she is as good as new. She is now named the Scotia, and is a barque-rigged auxiliary screw-steamer of about 400 tons, measuring 140 ft. by 29 ft. and drawing about 15 ft. of water. With her new engines and boiler she averaged a speed of over 8 knots at her trial trip and is therefore the fastest of any of the vessels at present cruising in the Antarctic regions. In spite of her immense strength the Scotia, whose wooden walls amidships are no less than 25 in. thick, is a well-modeled craft with fine lines, which will meet the ice backed by 9 ft. of solid timber. The leader, the captain and the scientific staff are accommodated in an after deckhouse, the officers in a comfortable cabin amidships, whilst the crew are quartered in the forecastle. The scientific work will be carried on in a deckhouse amidships, the after part of which forms the galley. Here there is good light for those who have to undertake delicate work, such as with the microscope, hydrometer, and other finely graduated instruments. A second laboratory, mainly for zoology, lies almost immediately below the upper one, 'tween decks, and is reached directly from the upper laboratory. Adjacent to this is a dark room for photography. 'Tween decks there are two great drums, each containing 6,000 fathoms of cable. The cable is led up on deck to a specially constructed 40 H. P. steam winch, thence over the side of the ship by means of a derrick, for the purpose of trawling and tapping in the greatest depths. The roof of the scientific deckhouse and its extension in the form of a bridge forms the center for the scientists, for this is where all the operations connected with sounding and physical investigation of the ocean will be conducted. Right aft on the poop is to be found an instrument which secures and hauls in by a special motor-engine huge kites, which will suspend meteorological instruments at great heights in the atmosphere. This machine, as well as all the hydrographical machines, can also be driven by a special engine, which is capable of hauling up instruments from the depths of the sea at the rate of 80 to 100 fathoms per minute. The Scotia will be navigated by Capt. Thomas Robertson of Peterhead, who has had 20 years' experience in Arctic seas, and who has also made a voyage to the Antarctic. The scientific staff consists of half a dozen picked scientists—four senior and two junior. The expedition will follow the route indicated by the society, a course being steered direct from Glasgow for the Falkland islands. At Port Stanley the expedition will spend a few days taking fresh meat and coal on board. From this point the Scotia will sail 1,000 miles to the eastward, and, after investigating the Sandwich groups, will strike southward. If the ice conditions in the Weddell sea prove favorable, the expedition will push as far south as prudent. Let us hope the Scotia will there do work worthy of her country and of the spirit of her owners.

STEAM TURBINE IN VESSEL OF LOW SPEED.

A memorable departure in the steam turbine for marine propulsion has just been made here in the steam yacht Emerald, which Alex. Stephen & Sons, Ltd., have launched for Sir Christopher Furness. In her marine engineers expect to determine some of the problems raised by the application of the marine steam turbine to the propulsion of ocean-going vessels. The Emerald is bound to throw light on the debatable question of economy of fuel at low speeds with steam turbines as compared with reciprocating engines. At present all the vessels in which turbines are used are swift, and doubts are entertained of the economy of using turbines in vessels of low speed. The Emerald is not intended for high speed, and as she is, so far as model is concerned, a vessel which will compare well with others of a similar type, the results of the experiment should be of exceptional interest. The new yacht, which has been built to designs by Mr. F. J. Stephen, the ship building manager of the establishment, is a vessel of handsome appearance, while inside comfort and extent of accommodations have not been sacrificed to obtain speed. The intention is to obtain a rate of about 16 knots, with an entire absence of vibration and an exceptionally low coal consumption. The Emerald is 236 ft. in length over all, 28 ft. 8 in. in breadth, and 18 ft. 6 in. in molded depth. She has been constructed under Lloyd's special survey to class 100 A1, and has a fine cut-water stem with a carved figurehead, a long square stern, and a range of teak paneled deckhouses extending amidships for about 118 ft. A promenade deck from side to side of the vessel is carried the whole length of the deckhouses, and on it will be placed the boats—one of which is a high-speed launch—and a large teak deckhouse for deck lounge and navigating room. The vessel has three sets of steam turbines, three shafts and five manganese bronze propellers, one propeller on the center shaft and two each on the side shafts. All these have been supplied and fitted on board by the Parsons' Marine Steam Turbine Co. of Wallsend-on-Tyne. The hull has been specially strengthened to prevent any vibration in the structure owing to the great speed at which the shafts will revolve. In the engine room, besides the three turbines with their condensers and the duplicate electric lighting machinery, there are a large number of auxiliary engines of all kinds. The main boiler, which is of very large diameter, is fitted with Howden's forced draft.

Sir Christopher Furness says that what Mr. Parsons, Messrs. Stephen and he had in view in fitting the Emerald with turbines was to put into the vessel such power as would enable her to steam at the highest rate compatible with entire freedom from vibration. He believed their object would be attained, and the comfort and the health of those who would sail on her. He believes, as a business man, and as one engaged with ships and shipping, that the turbine will practically revolutionize yachting and yacht owning in this country. The Emerald is the first of the kind to be built, and the builders and Mr. Parsons will make many trials and experiments with her, so as to obtain complete data for future purposes.

POWERFUL TWIN-SCREW STEAMER.

In former letters I have referred to the growing trade between Fleetwood and Belfast, due largely to the splendid service

of steamers afforded by the Lancashire & Yorkshire and London & North Western joint railway companies. Eleven years ago the joint companies decided to alter their service of steamers from paddle vessels to twin-screw steamers of the most modern type, and in 1892 the Duke of Clarence, the first of the new fleet, was launched by Laird Bros., Birkenhead, and immediately placed on the route. In 1894 the Duke of York, built bv Denny & Bros., Dumbarton, was placed on the route, other additions to the fleet being the Duke of Lancaster, built by the Naval Construction & Armaments Co., Ltd., Barrow-in-Furness, in 1895, and the Duke of Cornwall, built by Vickers, Sons & Maxim, Ltd., in 1898. Recently an order was given to John Brown & Co., Ltd., Clydebank, for a fifth steamer, the Duke of Connaught, which has been completed and is about to be placed on the route. The Duke of Connaught is a powerful vessel of 1,800 tons gross. She measures 315 ft. between perpendiculars, 38 ft. in breadth (molded) and 17 ft. 6 in. in depth (molded). The new vessel is built of mild steel, and is divided by eight water-tight bulkheads. Her rig is that of a fore-and-aft schooner, with pole masts fitted with the requisite derricks for the rapid handling of cargo. In addition to large spaces for cargo, accommodation is provided amidships on the main, upper and promenade decks for about 400 first-class passengers, and in the poop for about 400 steerage passengers. The first-class dining saloon is a large and handsome apartment on the upper deck, and occupies the full width of the ship, and on the promenade deck above is a well appointed smoking room. The spacious promenade is under shelter of a long boat deck, part of which is also given to the use of first-class passengers, and the fore part of which is railed off for the navigating staff. The propelling machinery has also been constructed bv the builders of the vessel, and consists of a pair of twin-screw, vertical, triple-expansion engines, each operating four cranks, and specially designed in the matter of balancing, so as to reduce vibration to a minimum. Steam is supplied by four large single-ended boilers, fitted with forced draft, and there is, in addition, a powerful donkey boiler for use with the windlass, winches, and other deck machinery. A complete equipment of electric lighting has been installed, and the ventilating and sanitary arrangements are excellently planned and up-to-date. The Duke of Connaught underwent her builders' trials on the Firth of Clyde this week, but the official trials will be run between Fleetwood and Belfast in accordance with the terms of the contract.

PROTESTING AGAINST SUBSIDIES.—OTHER MATTERS.

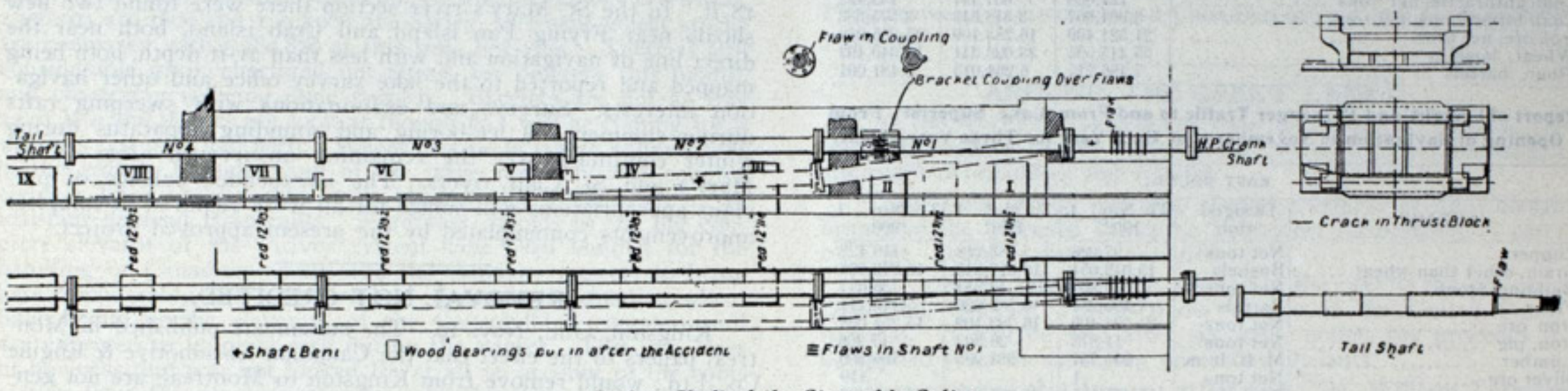
At a meeting this week of the executive council of the chamber of shipping of the United Kingdom the Scotch representatives were: Mr. W. F. G. Anderson, Glasgow; Mr. H. Hogarth, Glasgow; Mr. Neilson Bird, Glasgow; Mr. T. A. McIntyre, Glasgow; and Mr. James Cormack, Leith. Among other matters the question of subsidies to steamships was discussed, and the following resolution, of which the secretary (Mr. Cooke) was directed to forward a copy to the president of the board of trade at once, was passed:

"That the executive council of the chamber of shipping of the United Kingdom, having considered the reported probability of a large subsidy being granted for a fast mail service and also for a service of large freight steamers from Canada to Great Britain, protests strongly against the payment of any subsidies or subventions to shipping by the British government unless such subsidies or subventions are confined solely to the purposes of securing a thoroughly adequate mail service and for the utilization of such steamers by his majesty's government as cruisers."

Mr. W. F. G. Anderson, of the Anchor Line, Glasgow, whilst not opposing what was the evident feeling of the meeting, desired that he should not be regarded as assenting to the resolution.

The dividing and lengthening of a steamer is no novelty but some note may be given of an operation at Dundee this week, when the Caledon Ship Building & Engineering Co., Ltd., cut in two a large steamer, the Sultan van Langkat, in order that the vessel might have 50 ft. added to her length. The operation of hauling the bow half of the vessel away from the stern half the required distance of 50 ft. only occupied four and one-half minutes. Simultaneously with cutting the vessel open the work of laying launching ways at the bottom of the graving dock was commenced in a similar manner to what is done in the ship yard when a vessel takes the water for the first time, with the exception in this case that the ways had to be leveled, instead of being laid on a declivity, as is done in the yard. The declivity gives motion to the vessel on being released, but with the level ways power had to be applied, which was obtained by means of three traction engines being placed on the quay about 120 ft. ahead of the vessel. The power of each engine was increased by means of strong wire rope tackling and two three-fold purchase blocks. One end of each tackle was secured to the bow of the vessel and the other to an anchorage specially constructed on the quay, while the hauling part was led to a drum on the engines, thus making the mechanical advantage about six times the power applied. Whilst this power was considered quite equal to move the huge structures of about 800 tons weight along the ways, it was supplemented at the start of the pull with a number of hydraulic jacks, distributed around the parting section so as to assist in overcoming the excessive friction caused by the overlapping of the butts of plates and bars. The vessel is 285 ft. long originally, and being specially constructed for carrying oil in bulk she was subdivided and closely riveted, which made the work of cutting her apart far more difficult than it would have been had she been a vessel or ordinary type.

The special committee of the Clyde Navigation Trust charged with the duty of considering what can be done for straightening and widening the river so as to make it navigable from the city to the sea by the largest class of vessels, and also to make it possible for ship builders to build and float down the channel larger vessels than the Clyde has yet turned out, had a meeting last week. A deputation was received from the Fairfield Ship Building Co. and John Brown & Co., Ltd., Clydebank, who impressed upon the trust the necessity of proceeding as soon as possible with the deepening and widening of the river so as to enable them to launch vessels of the size of the new Cunarders, and to take them down the river. The committee requested the deputation to submit their proposals in writing, and promised to do all in their power to meet their wishes.



Broken Shaft of the Steamship Sultan.

REPAIRING A PROPELLER SHAFT AT SEA.

The following communication to the Engineer, London, from Robert Low, engineer-surveyor to the Germanescher Lloyd's, Bombay, regarding the repairing of a propeller shaft, will doubtless be of interest to the readers of the Review:

"I herewith enclose a tracing and description of an accident which happened on board the steamship Sultan, belonging to the Deutsch Ost Africa Line—German East Africa Line—which trades between East Africa and Bombay. The steamer left Zanzibar on July 30 last, and after steaming eight days, on Aug. 7 the coupling bolts connecting the tunnel shafting with the propeller shaft broke, i. e., four bolts broke inside the coupling and two outside the tunnel shaft flange at the junction of bolts and threads, the result being that the shaft twisted, rose, and worked excentrically round the propeller shaft, shattering the supporting plummer blocks in the whole length of the tunnel with the thrust block and its shoes, and then sprung over to one side and fell into the bottom of the tunnel, and in the action bending the thrust and tunnel shafting with their flanges to a considerable extent. The engineer succeeded, however, after extraordinary efforts, in getting the shafting into place, during which operation four 10-ton chain blocks and two screw jacks were broken. The shafting, though out of line, was supported by what remained of the old plummer blocks and additional wooden blocks. It required five days to effect these repairs, and after steaming five days at a slow speed the steamer reached Bombay on Aug. 17, without assistance. At Bombay the contract for straightening the shafting and renewing the blocks, etc., was placed in the hands of Messrs. Alcock, Ashdown & Co., Ltd., who carried out their work so expeditiously that a successful trial trip of the steamer was made on Sept. 20. Having inspected the damage on the steamer's arrival, I think that Capt. Ashrens and the chief engineer, Mr. Hugo Teuffel, deserve great credit for bringing the ship into Bombay without assistance."

F. H. Weeks, marine broker, 32 Broadway, New York, is looking for a steamer that will carry 200 passengers on 3½ ft. draught.

THIRTY-FIVE MILLIONS FOR LAKE SUPERIOR.

A freezing up of the lakes in November, which is hardly within the possibilities, is about the only condition that may now be expected to interfere with a record of 35,000,000 tons of freight moved to and from Lake Superior in 1902, as against 28,403,065 tons in 1901. The canal reports from the Sault (Canadian and United States) show a movement of 30,931,213 tons (net tons in all cases) to Nov. 1 of this year, compared with 24,543,610 tons on the same date a year ago and 23,090,766 on Nov. 1, 1900. The principal increase this year is, of course, in iron ore, although increases in wheat and flour are also important. On Nov. 1 this year the wheat movement aggregated 55,415,585 bu.; on the same date a year ago it was 33,026,341 bu. Flour shipments to Nov. 1 foot up 7,186,207 barrels, against 6,264,015 barrels on the same date a year ago. Soft coal shipments are 586,024 tons greater than thev were a year ago, but this is not sufficient to meet the increase requirements. A full summary of combined reports from both canals follows:

Movement of Principal Items of Freight to and From Lake Superior.

ITEMS.	To Nov. 1, 1902.	To Nov. 1, 1901.	To Nov. 1, 1900.
Coal, anthracite, net tons	124,608	657,147	435,422
Coal, bituminous, net tons	3,904,667,	3,318,643	3,575,333
Iron ore, net tons	21,524,409	16,283,109	15,255,038
Wheat, bushels.	55,415,585	33,026,341	33,340,493
Flour, barrels.	7,186,217	6,264,015	5,481,001

Report of Freight and Passenger Traffic to and From Lake Superior, From Opening of Navigation to November 1, of Each Year for Three Years Past.

EAST BOUND.

ITEMS.	Designation.	To Nov. 1, 1902.	To Nov. 1, 1901.	To Nov. 1, 1900.
Copper	Net tons	97,026	83,212	110,423
Grain, other than wheat	Bushels	15,042.054	13.617,843	10,349,003
Building Stone	Net tons	35,804	42,884	36,657
Flour	Barrels	7,186.207	6,263,620	5,475,414
Iron ore	Net tons	21,524.409	16,283,109	15,255,038
Iron, pig	Net tons	11,878	26,302	17,206
Lumber	M. ft. b. m	955,757	931,985	765,906
Silver ore	Net tons	1		110
Wheat	Bushels	55.415,585	33,026,341	33,340,493
Unclassified freight	Net tons	112,009	60,649	62,213
Passengers	Number	28,988	26,870	27,515

WEST BOUND.

Coal. anthracite	Net tons	124,608	657,147	435,422
Coal bituminous	Net tons	3,904,667	3,318,643	3,585,333
Flour	Barrels	235	395	5,587
Grain	Bushels	13,627	56,493	92,784
Manufactured iron	Net tons	156,335	121,128	100,109
Salt	Barrels	382,519	396,236	277,338
Unclassified freight.	Net tons	513,131	403,331	367,943
Passengers	Number	27,723	28,685	28,174

Summary of Total Freight Movement in Tons.

	To Nov. 1, 1902.	To Nov. 1, 1901.	To Nov. 1, 1900.
West bound freight of all kinds, net tons.	4,756,286	4,560,898	4,533,787
East bound freight of all kinds, net tons.	26,174,927	19,982,712	18,556,979
	30,931,213	24,543,610	23,090,766

	Vessel passages.	Registered tons.
To Nov. 1, 1902	20.001	27,754,698
To Nov. 1, 1901	17,421	21,329,455
To Nov. 1, 1900	17,435	20,279,938

GEN. GILLESPIE'S ANNUAL REPORT.

Gen. C. L. Gillespie, chief of engineers in his annual report to the secretary of war says that the new work on the Detroit river authorized in the last river and harbor bill, will be started this fall or early next year. Operations during the last fiscal year were conducted under three continuing contracts, the result of which was to increase the minimum depth of the improved channel to 21 ft. below present mean low water wherever work is being done. Gen. Gillespie estimates that it will cost $1,250,000 to complete the existing project and asks for an appropriation of $450,000 for work to be done during the fiscal year ended June 30, 1904. The report says that the new appropriation for increasing the capacity of St. Clair flats canal, $330,000, and a contingent $80,000 additional, will enable the engineer in charge to commence the construction of the second channel. No estimate is submitted for next year.

It will cost $4,000,000 to complete the improvement of Hay lake and Neebish channels in St. Mary's river, according to the report, and Gen. Gillespie asks for $88,000 for pushing the work in the next fiscal year. He says the funds now available under past appropriations will be applied toward increasing the width of the Little Rapids division of the channel from its present minimum of 300 ft. up to a uniform width of 600 ft., and the work will be done under continuing contracts as authorized by the river and harbor act of March 3, 1899, all the funds ($494,115) having now been actually appropriated. These contracts are already in progress and will be completed at an early date, under the funds and the authority of the June 13, 1892, appropriation new contracts will be entered in upon the completion of the old channel via the Middle Neebish and commencement of the new channel via the west Neebish.

The report makes no suggestion or recommendation as to the advisability of constructing a third lock at Sault Ste. Marie, such as has been agitating vessel men for the past few months. Gen. Gillespie simply recites the opening of the Poe lock to navigation in 1896, and states that work since then has consisted in completing the deepening of the canal and its approaches, rebuilding an extending piers, grading and improving canal grounds, etc.

During the past fiscal year there were removed from the St. Clair river section of the ship canal from Duluth to Buffalo portions of three shoals at St. Clair, Stag island and Grande Pointe, the total amount of material dredged being 80,753 cu. yds. The result of the work was to provide a clear depth of 21 ft. where the controlling depths before improvement ranged from 16½ to 18 ft. In the St. Mary's river section there were found two new shoals near Frying Pan island and Crab island, both near the direct line of navigation and with less than 21-ft depth, both being mapped and reported to the lake survey office and other navigation interests. Surveys and examinations with sweeping rafts during summer and ice-boring and sounding apparatus during winter continued over the remaining unsurveyed areas of St. Mary's and St. Clair rivers. The unexpended balance of previous appropriations will suffice for all work required to complete improvements contemplated by the present approved project.

REMOVAL NOT CREDITED.

Kingston, Ont., Nov. 10.—The statements published in Montreal papers to the effect that the Canadian Locomotive & Engine Co., Ltd., would remove from Kingston to Montreal, are not generally credited. They have not been confirmed by the president of the company, the Hon. William Harty, M. P. The fact that the company since purchasing the works has spent in the neighborhood of $100,000 in new machinery and equipment, is now enlarging certain departments in the works, and has even within the past six weeks paid $25,000 for some property lying next to its plant, does not indicate any intention of removal. In addition, the company has plenty of work on hand and many orders ahead. There is a possibilitv that large steamers may be built in Kingston within the next year or so. The big government dry dock here, that cost over $1,000,000 and is the largest and finest in Canada, is adjacent to the company's extensive works. Mr. Harty recently made the statement that the directors had thought of approaching the government to see if this dry dock could be leased for a certain part of each year, with the end in view of building big steamers, and for which there is now a market in Canada to a certain extent. Recent labor troubles in the city has caused the project to be dropped for the present time, but it may be revived before long. The general opinion in this city is that the works here will at some time turn out both steel steamers and locomotives. The fact that during the last few years one transhipping firm, the Montreal Transportation Co., has placed orders in Glasgow and Newcastle-on-Tyne, for three big steel steamers, and that the Canadian Pacific and other railroad companies are ordering engines from English firms because local builders have not been able to supply the number of engines wanted, would indicate a likelihood of plenty of work the next four or five years. There is no reason why the ship building industry would not be successful.

GOV. ODELL ON CANAL IMPROVEMENT.

In a recent address Gov. Odell of New York, spoke as follows regarding the policy of the state toward canal improvement:

"The canal always has been of great importance to the state, and I believe that if we are to maintain the commercial supremacy of our state and to retain our commercial interests something should be done to improve its condition and to make the canal adequate for the requirements of such commerce as naturally seeks the port of New York.

"Of course we must discount the fact that in the building up of the west and in the development of its railroad facilities a large part of the commerce which hitherto came as a matter of necessity now comes as a matter of choice, and that if the port

of New York is discriminated against because of the railroad combinations, because of the inadequate facilities for handling grain products of the farmers of the west, an enlarged canal will not entirely cure the evils, but that it will be but a beginning which must be followed up through legislation which shall provide for additional docking facilities and other necessary details.

"We have demonstrated the wisdom of hastening slowly, and have placed the proposition in such form that it can be intelligently passed upon by the people. In fact, there is nothing that I know of which would prevent this proposition from being passed upon during the year 1903. Another serious obstacle has been removed by enactment of laws which provide almost funds enough to meet requirements of the state through indirect sources of revenue. The Republican party, while pledging itself to canal improvement, also pledges itself to the freedom from direct state taxes, and has, therefore, important work before it of providing such additional funds as may be necessary to meet annual charges in the sinking fund. The next step that will be necessary will be lengthening of the period in which funds may be paid so that instead of 1/18 each year, as would be required under the constitution, the payments may be reduced to 1/50 or 1/75 each year. For that, of course, a constitutional method must be devised and submitted to the people, but work need not be hindered, because with the new revenues which may be derived and before first bonds would be due a constitutional amendment could be framed and submitted which would permit the refunding of the bonds to be paid within 50 or 75 years.

"The point which I wish to impress upon you is that the Republican party can be relied upon to make such canal improvements as are necessary without delay, and it will provide for the discharge and payment of the debt and without unduly burdening the people through additional taxation."

LAKE SUPERIOR IRON MAKING—GRAIN TRADE.

Duluth, Nov. 13.—Total grain stocks at the head of Lake Superior are now about 7,000,000 bu., of which 2,997,055 are wheat, 2,336,794 are flax and 1,213,066 are barley. Present wheat stocks are compared with 5,784,878 at this time last year. There is still considerable grain chartered out ahead, for delivery this month, and chartering is being done steadily. Receipts are not as free as of late and it does not look as though flax will be coming for a while as fast as it had been. Wheat may be in larger volume later in the season, though many of the large receivers and country elevator lines are diverting it to Minneapolis where there is an insistant demand from mills. A number of bins in the big concrete elevator of the Peavey system have been bonded for the handling of Canadian wheat, and the company expects to bring here considerably over 1,000,000 bu. Receipts of Canadian wheat have begun at the elevators of the Consolidated company and are expected to be quite free during the winter. This is a class of business that was not looked for at all on account of the completion from the grain country to Lake Superior at Port Arthur of the Canadian Northern road; but the facilities of both this road and the Canadian Pacific for shipment to the lake and for storage there are proving inadequate for the great volume of grain sure to come forward on the crop. It is now estimated that there is in the Canadian northwest a surplus of wheat and oats, rye and barley amounting to not far from 100,000,000 bu., and most of this will have to find its way to market via the lakes, either through Port Arthur and Fort William or through Duluth, before the crop of 1903 is harvested.

In addition to the new coal dock work planned for the coming winter and spring at the head of the lakes, referred to in this correspondence last week, is a large improvement to the dock of the Lehigh Coal & Coke Co., which has been forced to lie over this fall on account of scarcity of timber. The dock will be modernized and the slips dredged to 20 ft. A large extension will be made to the coal receiving docks of the Zenith Furnace Co., so as to be ready for coal for a coking plant that is decided upon. This coking plant will consist of eighty ovens and is to be ready for firing by August, 1903. It will relieve the company of the difficulty that has closed its furnace this fall. Ovens will probably be of the ordinary beehive type.

There is a notable increase in pig iron making on the upper lakes. First in importance are the furnaces of the Algoma Steel Co. at the Canadian Sault that will go into blast this winter. They will make 600 tons of iron and are to be added to as fast as possible. They are the nucleus of what will really be one of the very important plants of the west. The Cleveland-Cliffs Iron Co. is making 110 tons of charcoal iron daily at its Gladstone plant and will be ready to blow in its 150-ton furnace at Marquette before spring. This is, with the exception of one of the Cault furnaces, the largest charcoal furnace ever built. The old Pioneer and Carp furnaces at Marquette have been revived and reopened and are now making charcoal iron amounting to about 105 tons a day. The still-older Newberry furnace at Newberry, south from the pictured rocks, has been bought and will be rebuilt and opened. A charcoal plant of 40 ovens and a complete by-product plant will be installed. The Ashland furnace is making about 125 tons daily of charcoal iron. It has recently been largely rebuilt. It is now owned by Berry Bros. of Detroit, who have it for the purpose of securing a supply of wood alcohol for their varnish factories, the iron being really a by-product. They are also the purchasers of the Newberry plant and for the same purpose. The Zenith coke furnace at Duluth is just now banked on account of a scarcity of fuel, but will be making 250 tons a day in a week or so. This makes a total of 1,340 tons daily, active or soon to be operating, pig-iron capacity around Lake Superior.

The government engineer office at Duluth is preparing advertisements calling for offers on 65,000 barrels of Portland cement. This is many times greater than any lot of cement ever bought by the government in this district. It is a very large order. It is for the construction of the south pier for the Superior entry.

LAKE FREIGHT MATTERS.

It is the general opinion that the season of lake navigation now drawing to a close will end without changes of special importance in freights. The fall shipments of grain have not been up to expectations but after all the ore movement is the basis of the lake business and in view of the capacity of the lake fleet in excess of dock and railway facilities it would take very much more grain than has been shipped in any year in the past to interfere seriously with the ore movement. The ore shippers are, however, still disposed to move all the ore they can up to freezing time, but they do not expect to be called upon for nigher rates. Some of the vessel owners are also satisfied with the situation, as they feel that a spurt in the closing weeks of the season would not be of particular advantage for next year. Rumors of negotiations regarding ore freight contracts for next year are without foundation. Of course any of the shippers at any time would consider propositions from vessel owners, but they are n t asking for bids.

IMPORTANT CHANGES IN CANADIAN OFFICIALS.

James Sutherland, minister of marine and fisheries of the dominion government has been appointed minister of public works in place of Hon. J. Israel Tarte, whose resignation was recently demanded by the premier. Mr. J. R. F. Prefontaine, member of parliament, has been made minister of marine and fisheries. Mr. Prefontaine is a distinguished Canadian lawyer and is about fifty years old.

AROUND THE GREAT LAKES.

At the works of the Empire Ship Building Co., Buffalo, the steamer Niagara of the International Ferry Co., is receiving a thorough overhauling and rebuild.

Capt. John Dalton has been elected president of the Chicago branch of the Licensed Tugmen's Protective Association, in place of Capt. Louis Hohman, resigned.

An order of sale has been granted in the case of the schooner Davidson, lying at Toledo under charge of the United States marshal. It will be sold after six days' notice, the proceeds to be applied towards satisfying numerous libelants.

It is reported that Lewis Cartler and Capt. William Turgeon of Ludington are figuring on the construction of a wooden passenger steamer to run next season between Ashland and Bayfield. She is to be 100-ft. long with 23-ft. beam, and is to have a triple-expansion engine.

Favorable reports are heard from Portage regarding dispatch given to vessels at the new docks of the Portage Coal & Dock Co. of which Mr. W. P. Murray of Cleveland is president and Mr. H. G. Dalton vice-president. It is claimed that the clam-shell rigs on the dock have capacity of 200 tons an hour.

Capts. John Hennessy and Edward McGary, commanding respectively the tugs Prodigy and Tom Brown of Chicago, have been suspended for ten days each by Messrs. Richardson and Moore, the steamboat inspectors of that port. The cause of the suspension is a collision which occurred between the two tugs in midlake. The evidence showed that they were racing for a tow and it was held that they were careless.

Three very large new steel steamers of the lakes are given ratings, insurance value, etc., in the November supplement to Inland Lloyd's register. They are: John B. Cowle, built by the Jenks company of Port Huron, A1 and $260,000 value; Muncy, built by Detroit Ship Building Co., A1, $250,000; Moses Taylor, built at the Cleveland yard of the American company, A1, $265,000. The large wooden schooner recently launched at James Davidson's West Bay City yard rates A1* and is valued at $110,000.

Gage records of the United States lake survey show the following mean stages of water for October, above mean sea-level: Lake Superior, 602.30 ft.; Lakes Huron and Michigan, 579.74 ft.; Lake Erie, 572.38 ft. These stages show Lake Superior to have been 0.21 ft. lower than during the same month last year, and 0.28 ft. lower than in October, 1895; Lakes Huron and Michigan 0.42 ft. lower than during the same month last year, and 0.68 ft. higher than in October, 1895; Lake Erie, 0.96 ft. higher than during the same month last year, and 1.49 ft. higher than in October, 1895.

Another chapter has been added to the gloomy history of the little tug Record. She was sunk at Duluth last week by the steamer Bransford. Twice before has the Record been sunk and on each occasion some member of her crew has lost his life. This particular accident is not attended with tragedy, though Thomas McAllister, the fireman, was severely scalded. The sinking of the Record last week occurred at the ore dock at Su-

perior. While the Bransford was being towed to her position under the ore shutes she struck the tug head on and sank her in 22 ft. of water.

Mr. John Marron, agent at Cleveland for the Anchor Line, announces that no freight will be received after Saturday, Nov. 15.

Capt. W. W. Morse died at Painesville this week. He had sailed the lakes for forty years but retired about five years ago to enter other business. His last vessel was the Siberia of the Moore fleet, Cleveland. He was sixty-eight years old.

G. A. Tomlinson of Duluth certainly paid $250,000 and possibly $260,000 for the steel steamer Yosemite, which he purchased a few days ago from Detroit parties. This steamer, built last year at the Wyandotte yard of the Detroit Ship Building Co., is one of the finest of the modern freighters.

It is more than probable that the railroads in the lake region will hold to their decision not to give to sailors this fall the benefit of half-fare rates to their homes after placing ships in winter quarters. As the railroad fares of the crews are usually paid by the ship owners, the latter, who are charged with having abused the privilege, will be the sufferers.

An Ottawa dispatch announces that at the request of the transportation interests the minister of the interior, Hon. Clifford Sifton, has arranged for the prolongation of the season of navigation on the upper lakes in order that every facility may be provided for the moving of the grain crop of Manitoba and the northwest territory. The lighthouse system on these lakes will be maintained until Dec. 12.

It is reported that another freight line is to be established between Georgian bay and Lake Superior ports with headquarters at Collinwood. The provisional directors named in the application include Michael Straus, grain exporter of Chicago; J. J. Daley, representing Rogers, Bacon & Co. of Chicago, and a number of Toronto and Collinwood men. The capitalization of the company is $1,000,000 of which $500,000 only is to be issued at present.

Mrs. Agnes E. Garrity, 302 West North avenue, Allegheny, Pa., is anxious to learn of her son John Kenneth Garrity. She fears that he may possibly have been drowned. Previous to Sept. 20 last he was employed in the linen room of the side-wheel steamer City of Mackinac, running out of Detroit. He then wrote that he was going to work on a freight boat as watchman. He did not name the freight boat. Nothing has since been heard of him.

On the recommendation of Capt. Keller, corps of engineers, U. S. A., Grand Rapids, Mich., the war department has authorized the expenditure of a sum of money for plans for a new steel survey and inspection vessel for service on Lake Michigan. W. J. Wood, naval architect of Chicago, has been engaged for the work of designing the boat and preparing all plans and specifications to build from. Some latitude will be allowed the designer in regard to the dimensions of the new steamer, just so that he keeps her within the limit of the money already on hand for building the vessel.

While bound down Lake Huron on Tuesday fire broke out on the steamer R. A. Packer and gained such headway that the crew were forced to abandon the vessel and take to the yawls. Later the steamer Thomas F. Palmer and the tug J. E. Rumbell sighted the burning vessel and succeeded in getting alongside and putting out the fire. The Packer was then towed to Detour. Her smoke stacks had fallen, her after cabin was almost destroyed and her deck had burned for a long distance forward. The Packer is owned by John A. Connelly of Chicago. It is likely that the salvage will amount to a considerable sum.

Since the dredges at work in the vicinity of Amherstburg and Bois Blanc island, Detroit river, have shifted to the east side of the channel, great difficulty has been encountered in inducing vessel masters to keep close over towards the float lights on the Bois Blanc island side. The floats mark the west side of a 250-foot channel that has been swept several times and has full 21 ft. Capt. George P. McKay, who has personally investigated the situation at this point says there is no danger whatever in "hugging" the floats on the Bois Blanc side. Capt. McKay suggests that all down-bound boats blow one whistle for a vessel coming up and pass port to port and not compel the up-bound boat, which has not the right of way, to cross over and pass to starboard.

Briefly stated, and from the best information that can be had from Chicago, this is all the truth there is to the reports of a combination of passenger boat interests on Lake Michigan: A Chicago gentleman who has been known for years in marine circles some months ago secured figures from the Goodrich, Graham & Morton and other companies regarding their business. He also obtained prices on their property. The showing he was able to make would not enable him to get money for the consolidation. Now another has taken the matter up without knowledge of the first figures. As it is said that the prices upon which promoter No. 2 is trying to effect a combination are considerably higher than the first figures, the chances of the deal going through are, to say the least, very slim.

Gen. Supt. Ripley of the Sault Ste. Marie canal has received word to the effect that the secretary of war has approved the project of the Hay lake and West Neebish channels and the deepening of the Middle Neebish. It is expected that two dredges will be put in commission at once, making one cut through the flats at the foot of Hay lake to the rock cut or the falls at the West Neebish. This cut is to be made at this time for the double purpose of determining the nature of the material to be excavated and in order to make a channel for the scows and dredges to the rock cut. The cut through the rock at the rapids will be mostly dry work and a cofferdam will be constructed across the head of the rapids during the winter. The entire work will cost $4,000,000. The West Neebish channel will be 300 ft. in width and is designed to be used exclusively for down-bound vessels.

THE FEDERAL TRUST CO.

Within the past few years Cleveland has developed several substantial trust companies. The growth of the city has made them very successful. In marine circles attention was first especially directed to these large financial concerns by their dealings in ship bonds. Not long ago all ships of the lakes were paid for in full when built. Now few of the big steel freighters are built without an issue of bonds covering about half of their cost. The trust companies have made this possible. Nearly all of them have taken ship bonds and have gradually found buyers for them. The bonds are, of course, a high-class investment. They are fully secured by insurance on the ships and have also in Ohio, the additional security of stockholders' liability.

As Cleveland's advancement has probably been due more to its iron, coal and shipping interests than to any other branch of industry, it follows that one of these trust companies, the largest in the state in point of capital, is controlled by men prominent in these lines. Messrs. J. C. Gilchrist, Harvey D. Goulder and Frank M. Osborne, all very well known throughout the lake region, are directors in the Federal Trust Co. of $1,500,000 capital. Mr. Gilchrist is president of the company. The Federal is among the most successful of the trust companies and its progress has undoubtedly been due largely to its business connections of a marine kind. It is located at the corner of Water and Superior streets in the immediate vicinity of the Perry-Payne, Western Reserve and Wade buildings, that contain offices of all the ore, coal and vessel companies. Its operations are not, however, confined to Cleveland. By special effort a business has been built up through correspondence with vessel men in different parts of the lakes. On the first Monday of October, after only sixteen months of business (opened June 3, 1901) this company issued the following statement:

RESOURCES.

Loans on real estate	$ 55,200.00
All other loans and discounts	2,714,047.80
Stocks and bonds	443,547.50
Due from banks and bankers	447,657.00
Furniture and fixtures	000.00
Cash on hand	58,662.00
Total	$3,719,114.30

LIABILITIES.

Capital stock	$1,500,000.00
Undivided profits	152,783.12
Reserved for interest	2,923.91
Deposits	2,063,407.27
Total	$3,719,114.30

Of course the charter permits of a wide scope of business dealings, including savings deposits, on which 4 per cent. interest is paid, with 2 per cent. on check accounts of suitable size; permits of the company acting as executor, trustee, administrator, guardian, assignee, receiver, registrar, transfer agent and fiscal agent. Orders for investment securities are executed. Letters of credit and foreign drafts payable in any part of the world are issued. All kinds of real estate is managed, leases made, rents collected, properties improved and sold, etc., etc.

Mr. Geo. F. Clewell is secretary and treasurer of the company and Mr. Geo. J. Bailey assistant secretary and treasurer.

MARINE CONSTRUCTION & DRY DOCK CO.

The Marine Construction & Dry Dock Co. of Mariner Harbor, New York, reports having received a contract for building a 116-ft. steam yacht—extra heavy construction of wood with steel floors—for a New York party. They also have an order for a 62-ft. gasoline yacht for R. H. Stearns, president of the Hotel Nevarre Co., to have a 20-H. P. explosive engine. Houses and all interior wood work are to be finished in mahogany. The owner is to supply his own furnishings. The dredging which this company has been doing for the past few months as well as the 500-ton marine railway, docks and building-ways are nearly completed, and steel working machinery is being put in place. The boat shop is now working on life boats for two 490-ft. Atlantic transport ships, building at the New York Ship Building Co.'s works, Camden, N. J.

FROM THE CHIEF OF THE MASTERS AND PILOTS.

The decision of the United States attorney general as to what is required of licensed officers of the steamboat inspection service in investigations before local boards of that service has stirred up the officers of the American Association of Masters and Pilots. Grand Captain John C. Silva of that organization sends the Review an extended communication on the subject. The decision was the outgrowth of litigation attending the recent strike of tug men on the great lakes and was published in full in these columns Oct. 23. Capt. Silva says:

Editor Marine Review:—Having carefully read the treasury decision in Vol. 5, No. 43 of "Treasury Decisions, I must say that it is now nearly time that the licensed steamboat officer began to wake up to the situation that confronts him; to realize that he has none of the rights that are conferred on other citizens of this great and glorious country. He should be careful of obligations and oaths taken in any of the organizations of which he is a member, for if any corporations that may employ him care to do so, they may, upon preferring charges to local inspection boards, compel him to divulge information he has sworn to conceal within his bosom, or suffer the penalty of suspension or revocation of license. With the local board the questions must simply be material to the inquiry. This is the decision of the attorney general of the United States, who has just reversed a contrary opinion by the solicitor of the treasury. The attorney general is now at work on an anti-trust bill. This would seem like rather disagreeable business for the honorable gentleman, as in rendering the decision regarding licensed steamboat officers he has clearly laid out a course for trusts to do as they please. He has even made the handling of the licensed officer optional with the local inspectors, and the trusts also, for the questions usually asked during trials of the kind involved in the case are put into the mouths of local inspectors by the legal representatives of the accusers. In the case that brought out this decision a one-sided trial was conducted. Lawyers for one of the most powerful trusts on the great lakes used every means in their power to compel the accused licensed officers to divulge the secret work of their organization—the obligations taken when they became members. The licensed officers flatly refused to do this and the result was the appeal to the solicitor of the treasury and afterward to the secretary of the treasury, or rather the attorney general, when the opinion of the solicitor was not found satisfactory. The first question was:

"When a licensed officer is summoned to give testimony before this board (local board of inspection service) in a hearing, and refuses to answer questions which are in the opinion of the board material and proper, has the board authority to compel answer to under penalty of suspension, or revocation, of the witness's certificate of license or otherwise?"

The solicitor of the treasury replied to this question in the negative. When an appeal was made later to the secretary of the treasury, the decision was reversed by the attorney general of the United States, who answered yes, and thus we have the treasury decision that is the subject of this communication.

The second question asked by the trust lawyers of Cleveland was: Has a licensed officer who is charged with violating section 4449 of the revised statutes, and is on hearing before this board on such charge, the right to refuse to answer a question material to the inquiry, on the ground that his answer may subject him to the penalty of section 4449?" The reply of the solicitor of the treasury to this question was yes, but following the appeal to the secretary of the treasury the solicitor was reversed in this regard also, the attorney general saying no in the treasury decision under discussion.

In the early part of the explanation offered by the honorable attorney general for his findings he says: "The entire plan of government control over this branch of commerce and its instrumentalities, as shown in title 52 revised statutes, is based on public interest in the better 'security of life,' justifying the creation of a special government service regarding the management, navigation and inspection of sea-going vessels and vessels engaged in trade on the great lakes and other waters of the United States, etc., etc."

The case in hand did not apply to passenger steamers, where the "security of life" was essential or necessary. Tug boats were the type of steamers under consideration. Only in rare cases are these vessels allowed to carry passengers for hire, and usually this is allowed under a special permit limiting the number. As I interpret the law, these craft must, therefore, carry the equipment necessary to meet the regular passenger steamer requirements as to life saving apparatus, etc., for the number of passengers allowed, but I will venture to say that not 20 per cent. of the boats so specially licensed are equipped as the law requires; and so we fail to see where any of the conditions tend to limit the number of those qualified and licensed to the advantage of the men actually in the service.

Now as to the provisions of section 4449, revised statutes. It would seem that it has been possible to so construe the law that the licensed officer must serve under his license whether the relations between his employer and himself are satisfactory or not. It would seem also that "hindrance to commerce" will be defined by the legal representative of the owners, or the local inspectors, regardless of what might be said in favor of the licensed officer, who, owing to his peculiar calling is unused to argument and oftimes as helpless as a child in the hands of men who are professionals in this line. The decision also says that "the authorities holding that a witness may refuse to answer a question that would expose him to a penalty or forfeiture appear to be mainly in cases involving violations of penal statute and that section 4449 is a remedial and not a penal statute" But before hearing this we are told that "local inspection boards are created courts and as such they have certain power, etc., etc." It would seem, therefore, that the licensed officer summoned to appear before a court composed of local inspectors must answer all questions on the claim that the revocation of his license is not a penalty or a forfeiture; it is merely taking away from him the means of obtaining his bread and butter—a remedial statute!

It was suggested by the solicitor of the treasury in his opinion dated June 9, 1902, that on the trial of a licensed officer before the board for the violation of section 4449, questions might be put which, if answered, would disclose facts showing that the officer had incurred a penal liability, for which he was liable to indictment and punishment, as under section 4437, revised statutes, in such a case the officer would be entitled to refusal to answer. But we are told in the "revised" decision that this "has nothing to do with the present inquiry, which is confined to refusal on the ground that the officer may be subjected to the penalty of suspension or revocation of his license." From this it would seem to me that when the revocation of license is the issue, the forfeiture should be evident to local inspectors, but as it frequently happens the influence of the legal thought is the governing factor and the licensed officer the only sufferer.

Let me refer to a few lines from a letter recently published by James A. Dumont, supervising inspector-general of steam vessels. "The efficiency of this service," he says, "is excelled in no other country, and I quote no less authority than the naval officers of America." This may not be the exact language but it is substantially correct, and I believe the statement is true. Has not the licensed officer some part in this efficiency, or is he made up of such poor material that he cannot receive, when on trial so seriously affecting his means of obtaining livelihood, the same privileges that other citizens receive? Is he to suffer this loss because he voluntarily offered himself for examination at the office of one of the local inspection boards, successfully passed their examination and obtained his license? Is not the license evidence in itself that this same board pronounced him qualified and worthy? I believe that the local inspectors have jurisdiction over that license only while the holder is actively engaged under it, and it is not compulsory that the license be in continuous service, as circumstances over which the holder of it has no control often compel him to seek other service in order that he may be employed.

The time is not far distant, I think, when it will be found necessary to so change the rules of this very important service that nothing short of a total revision will accomplish the necessary result.

JOHN C. SILVA.

Boston, Nov. 13, 1902.

A BEAUTIFUL BIT OF ADVERTISING.

Whenever the Safety Car Heating & Lighting Co. of New York does anything in the printing line it can be depended upon to be well done. Its latest catalogue, entitled "Pintsch System of Car and Buoy Lighting," is no exception. The cover is beautiful in its simplicity. It represents a male figure bearing an olive branch and crowned with the laurel wreath of victory, while in the distance is a solitary star of light. Its meaning is probably to typify the peaceful conquest of the problem of light. The book is printed in two colors—black and yellow. The catalogue recounts the history of the development of the Pintsch system of lighting, with special reference to the United States. It is illustrated with photos of the branch plants of the company which have been established for the purpose of storing gas. Of course the big business is with the railways but the use of the system in aiding navigation is not inconsiderable. There are now throughout the world about 1,250 Pintsch gas-lighted buoys, A recent invention of the American company in this marine field is the automatic Pintsch gas-lighted bell buoy. The advantages of this buoy over the ordinary bell buoy are readily apparent to most navigators. In the case of the old-fashioned buoy the sounding of the bell signal was dependent upon the movement of the water, and as it is well known that when a fog prevails the sea is usually calm, little reliance can be placed upon the old-style buoy for sounding a warning. In the case of the Pintsch buoy a fixed or flashing light is shown, and the gas passing from the body of the buoy, which forms the receiver for the gas, up into the burner is led through an ingenious mechanical device which sets in motion the ringing mechanism of the bell. The English Pintsch company has recently equipped an automatic lightship with this device. This ship has been stationed on the west coast of Scotland at the Otter rock, near Islay. There are about seventy Pintsch buoys in use on the great lakes.

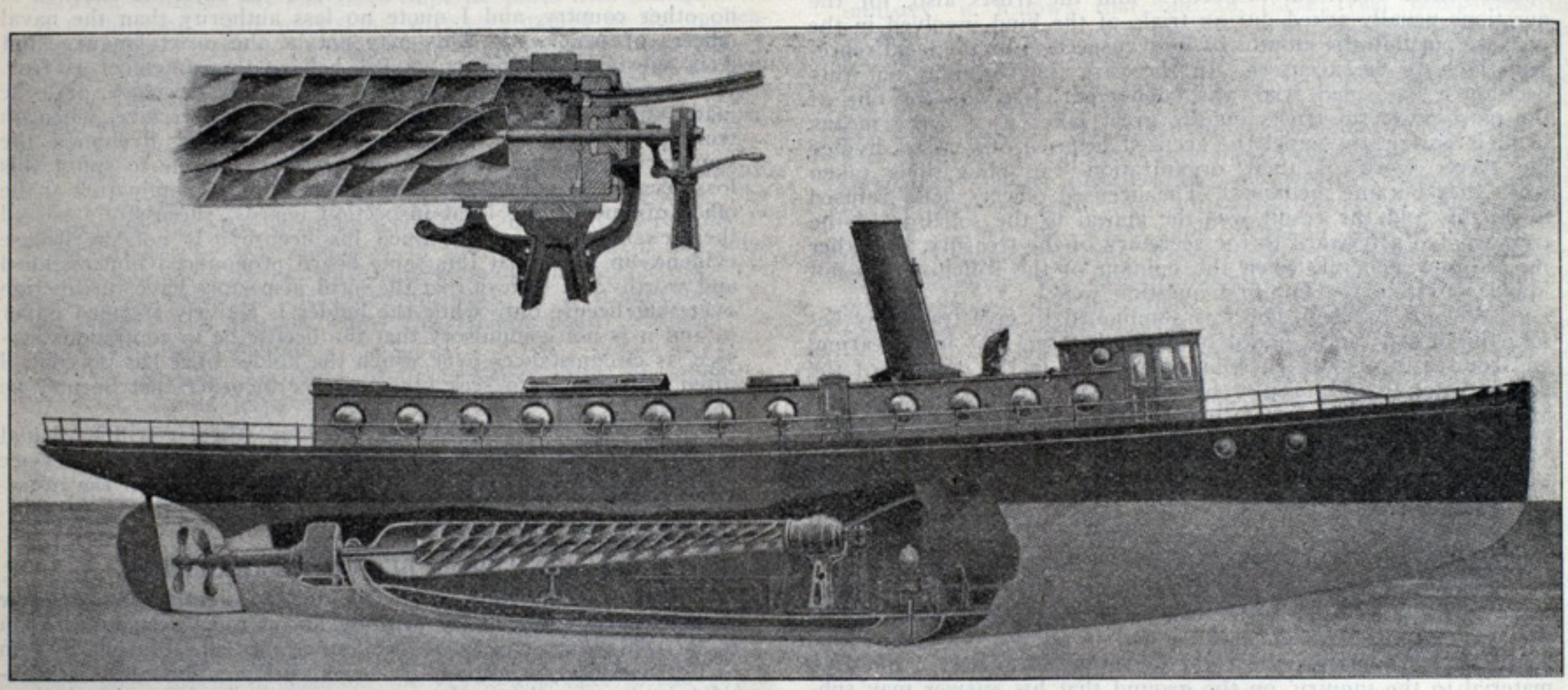
The Atlantic liner City of Rome, built at Barrow, of iron in 1881 for the Inman Line, but never taken over by that company, is at last to meet with a melancholy end. She has since her rejection by the Inman Line been utilized by the Anchor Line for summer service, spending her winters in ordinary at Greenock. Now the twin-screw Columbia is to displace her. The City of Rome has just been sold to Amsterdam parties for $85,000 for breaking up purposes.

ASTOR'S TURBINE PATENT GIVEN TO THE WORLD

Col. John Jacob Astor has given to the world his patents on marine turbines. He makes his announcement in the current issue of the Scientific American in the form of a letter to the editor of that publication. As yet no engine has been built to utilize Col. Astor's patents but engineers have expressed themselves as sharing the colonel's belief that his theories will work out practicably. Col. Astor's invention contemplates twin screws set tandem instead of side by side and revolving in opposite directions. His letter is as follows:

"All my patents on marine turbines having been granted, I hereby dedicate them to the public, in the hope that the development of the ideal turbine may be hastened thereby. The turbine is shaped like a funnel, and comprises an outer shell or drum and an inner shaft running axially through it, these parts being relatively rotatable and each having oppositely set spiral blades. The steam is admitted into the outer shell at the small end and passes through the turbine, expanding into the large end of the shell and acting on the spiral blades to rotate the shell and shaft simultaneously and in opposite directions. By allowing both the inner turbine and the outer case to revolve, the speed necessary to insure efficiency, which in ordinary turbines is often inconveniently high, is cut in half. As a result of this construction the weight is reduced practically 50 per cent. By passing the inner solid shaft through the outer hollow shaft or drum, the structural advantage of running both through the sternpost of the ship is obtained, this being the strongest part. Moreover, the shafts are incased and protected for almost their entire length without changing the shape of the hull. Retaining all the advantages of twin screws, the propellers are little exposed to danger in docking as in a ship with a single screw. Since both propellers revolve on the same axis, in opposite directions, but little power is wasted in imparting a rotary motion to the water, for after the passage of the ship the water is left entirely dead except for the necessary reaction resulting from driving the ship ahead. To sum up, the following appear to me the principal advantages: First, reduced weight; second, higher steam efficiency; third, higher mechanical efficiency, by reason of the reduced size enabling the parts to be fitted more perfectly, permitting the dimunition of friction and also the reduction of the leakage loss; fourth, such a turbine would seem to be particularly suitable in central station work for generating electricity, in which case the field and armature may be driven in opposite directions. This would improve the efficiency of the dynamo and increase its output for a given weight. This principle is obviously also applicable to gas engines."

Further particulars and details may be obtained, Mr. Astor says, by securing a copy of patent No. 690,821.



Col. J. J. Astor Dedicates his Marine Turbine Patents to the Public.

WORK AT FORE RIVER SHIP YARD.

Quincy, Mass, Nov. 12.—The United Fruit Co.'s steamer Admiral Dewey left the Fore River Ship & Engine Co's yard at this point Nov. 2, practically a new vessel. She was given a thorough overhauling inside and out while she was under repair. New tops were put on her tanks, her decks were relaid, and a new base plate was set under her engines, which were largely rebuilt. The inside of her hull underwent a careful examination, every part that showed the slightest wear was renewed, and she was completely repainted.

The fitting out of the protected cruiser Des Moines at the ship yard has progressed so rapidly that it is expected that she will be ready for her official trial early next summer. The laying of the wooden main deck has been finished, her condensers and windlasses are installed, all the auxiliary machinery, including the various sets of pumps, is ready to go into her hull, and the work of putting in her electrical plant has been begun. The main engines are being set up now.

The stern post for the battleship New Jersey is being finished in the machine shop preparatory to putting it into position at once. It is in one casting weighing 11 tons. The protective decks of both the New Jersey and Rhode Island were about one-third laid last week and the hull plating of the forward section of the vessels has been well started since the stem was set up.

One of the New Haven railroad's steel car floats is to be launched from the ship yard next week and the other some time during the week following.

FROM NAVY YARD AND NEWPORT NEWS SHIP YARD.

Newport News, Va., Nov. 13.—The auxiliary cruiser Prairie, with 560 marines aboard, the protected cruiser Detroit, the converted yacht Vixen, and the government tug Leyden, towing six new coal barges for the use of the fleet in southern waters during the approaching winter manuevers, sailed from Hampton Roads a few days ago, bound for Culebra, where the marines will be put ashore, and where preparations will be made for the arrival shortly of the European, South Atlantic and North Atlantic squadrons. The cruiser Olympia preceded these vessels by several days and is now engaged in marking the anchorage grounds for the fleet. The cruiser San Francisco has arrived in the Roads from the navy yard to await the coming of the main detachment of the North Atlantic squadron, which is expected here from New York this week.

The second-class battleship Texas, which has been for a long time at the navy yard being overhauled, has been placed in commission with Capt. W. T. Swinburne in command. The Texas will be ready to join the North Atlantic squadron in a few days. The cruiser Cincinnati has arrived from San Juan and is now in dry dock, being made ready for active sea service. The gunboat Bancroft has sailed for San Juan, where she will be regularly quartered as station ship.

Commander John E. Pillsburg of the naval general board spent several days at the navy yard in conference with Admiral Cotton, the commandant, relative to preparations for the reception of the North Atlantic squadron. All of the ships will be coaled and supplied at this station. At the navy yard now are the Texas, Arkansas, Puritan, Cincinnati, Topeka, Buffalo and Gloucester, all of which will join the North Atlantic squadron.

The keel has been laid at the ship yard for the large oil steamship to be built here for the Saginaw Steel Steamship Co. The Morgan liner El Mar, which was overhauled at the ship yard, was given a trial Saturday and will leave some time this week to resume her trips between New York and Galveston. The work on El Mar cost something like $50,000.

Commissioners appointed to fix the price of 272 acres of land wanted by the government adjoining the navy yard are sitting now and it is expected that they will reach a decision in a few days. This land is wanted for the purpose of enlarging the navy yard, which now covers only 80 acres. It will be seen from this that the navy department has in view some extensive plan of improvement. It is intimated that the land will bring in the neighborhood of $3,000 an acre. A new dry dock, new barracks and new powder magazines will be built.

USE OF LIQUID FUEL.

Rear Admiral Melville enters very thoroughly into a discussion of it—Some experiments which the navy has conducted—Trial trip of the Mariposa.

Rear Admiral George Wallace Melville in his annual report, which has just come from the press, and which has already been touched upon in the Review, goes very thoroughly into the question of liquid fuel, of which he has made an especially intimate study during the past year Incorporated in the report is an account of investigations of the bureau of steam engineering aboard the steamer Mariposa while using oil exclusively under her boilers on a round trip between San Francisco and Tahiti. The performance of this steamer as noted by the naval officials is now for the first time made public. The Mariposa, which is owned by the Oceanic Steamship Co., is one of the largest of the vessels in the Pacific trade that have been fitted for the use of oil as fuel.

After the admiral's manner he plunges abruptly into the subject of his discourse, saying:

The use of crude oil as a combustible for marine purposes has probably increased to a greater extent during the past two years than during the previous century. This has been due to several causes. The character of the oil lately discovered throughout the world is particularly applicable for use as a fuel. The oil fields are likewise near tide water, and therefore it is possible to construct pipe lines to the sea and deliver the product on board the tank steamers at comparatively slight cost. There is also good reason for believing that the wells are not likely to be soon exhausted and that an ample supply can be assured for an increased demand of the future. It is evident that there is a very strong desire and purpose upon the part of many shipowners to substitute oil for coal. The thermal, mechanical and commercial advantages that would result from a change are so well known that it is unnecessary to recount them. Nearly every reason that can be advanced for using oil as a fuel in the mercantile marine is also applicable to the navy. In the case of warships, however, there are also military benefits to be secured that are as important as the commercial and mechanical advantages. Any fuel installation which will obviate the smoke nuisance, reduce the complement in the fire room, extend the steaming radius of the war vessels, and permit maximum speed to be obtained at shorter notice, increases the efficiency and value of the fighting ship.

The numerous experiments that have been made by several naval powers during the past forty years in the attempt to use oil as a fuel show how important this question is regarded by military experts. It is now plain why success was not attained. There was too much effort exerted to burn oil in the same manner as coal. It is now realized that the oil should be atomized (it is impossible to completely gasify it) before ignition, and that the length of the furnace, the volume of the combustion chamber, and the calorimetric area are factors which must be considered. In fact, it is highly probable that it may be found advisable to design a special boiler for burning oil. As more time, talent, and money are now being devoted to the solution of the problem, the hope of securing success has been greatly strengthened. Many unreliable statements have been published as to the success secured, but careful investigation shows that they were inspired by interested parties. It can be well understood that it is exceedingly difficult to secure reliable data at the present time. The several ship owners, manufacturers and inventors are not inclined to tell of their disappointments, reverses or failures. Those who have attained success as a result of experiment and experience do not feel called upon to give the world information that has been obtained at considerable cost and trouble

Expert testimony is often of doubtful value. With regard to such testimony, a distinguished jurist once remarked that its character frequently depended upon who paid the retaining and professional fee. In view, therefore, of the trifling amount of reliable data extant, the bureau has projected an extended series of tests to determine the value of liquid fuel for naval purposes. These experiments commenced a few months ago. Taking into consideration the inevitable delay that must result from the installation of various burners, and recognizing the fact that competitors expect and should be permitted to make preliminary trials, it can be stated that the experiments have been conducted with considerable rapiditv. It takes about one week to install a new burner, make preliminary tests, and conduct two official trials. In some quarters there seems to be a prevailing idea that the government has established an experimental plant where inventors can have the opportunity of developing and perfecting their appliances. The bureau has no such purpose in conducting the tests, for it is expected that each competitor will carefully study the detailed drawings furnished him of the experimental plant, and therefore be prepared to fit his appliance and be ready for a preliminary trial in two days from the time the plant is placed at his disposal.

The problem of using liquid fuel for naval purposes is quite distinct from the problem of its use in the mercantile marine, although the conditions on passenger and freight ships approximate very closely in some respects to service requirements. For ships of war the problem can therefore be solved only by the department making its own tests and experiments. The performances, however, of the merchant ships having oil-fuel installations have been cerefully observed. Representatives of the bureau have been officially directed to report and observe upon the efficiency and sufficiency of such installations. Some of the most successful marine installations on both the Atlantic and Pacific coasts have been examined. The owners of the steamers J. M. Guffey, Paraguay, City of Everett and Mariposa, having permitted the bureau to report upon the oil-fuel installations of those vessels, a careful and extended investigation as to the characater of each of their plants has been made. The liquid fuel board has also examined the method of refining oil, and the department has communicated with scores of individuals and corporations who have demonstrated by actual experience that they possess an intricate knowledge of some phases of the question.

INTRICACIES OF THE WARSHIP PROBLEM.

The more this question is investigated the more intricate seems the problem of successfully installing an oil-fuel appliance on board a battle ship. It ought to be successfully used on the torpedo boats, as well as upon auxiliary naval vessels that steam between regular ports. For the army transport service it might prove very desirable, since a supply of oil could be maintained at the several calling ports. In regard to the installation on the large powered battleships and armored cruisers, there are three distinct features which must be considered, namely, the mechanical, commercial and the structural. Regarded from two of these view points it seems as if it would be some time before "coaling ship" ceases to be an evolution upon the war vessel. While both the naval and mercantile vessels traverse the ocean, there is a wide difference in their construction as well as in the nature of the duty performed, and this must be taken into account in designing the motive plant. In the investigation of the subject of using liquid fuel for naval purposes it will be necessary to give due weight to the various features that will influence, if not determine, the solution of the problem. The question, therefore, comprises the following divisions:

First—The engineering or mechanical feature. This relates to the efficient and economical burning of oil, and to the possibilities of increasing the consumption at short notice, so that maximum power can be readily and easily obtained. From the time the mechanical experts realized that the efficient, economical, and rapid burning of liquid fuel was greatly dependent upon the success secured in atomizing the oil there was rapid development. It was only a few years ago when the oil was simply thrown into the furnace by means of an injector. When that method was used the evaporation was dependent to a great extent upon the amount of incandescent surface that could be secured to ignite the fuel. It has only been within the last three years that the exceeding importance of atomizin~ the oil has been recognized. It may therefore be affirmed that the efficiency of the burner is simply proportionate to its power to atomize the oil and then to turn these minute particles of oil into a mixture of combustible gas and fine particles of carbon, so that complete combustion, as well as ability to force the consumption of the oil, can be secured. There are many burners which can atomize the oil quite satisfactorily, and as constant and progressive improvement is being made in this direction, the engineering and mechanical problem is nearing solution. The heating of the oil, as well as the heating of the air required for combustion, must be provided for, and extended experiments should be made to determine the simplest and the cheapest methods of attaining these objects.

The necessity for heating the air requisite for combustion should be impressed upon all contemplating the use of liquid fuel as a combustible. It would be best to force the passage of this air over heated surfaces either by forced or induced draft, but as this might involve considerable expenditure for installation, it is possible that simpler means might be effectual. The bureau hopes before these experiments are concluded to make a special series of tests showing the evaporative efficiency secured when admitting the air to the furnace at different degrees of temperature.

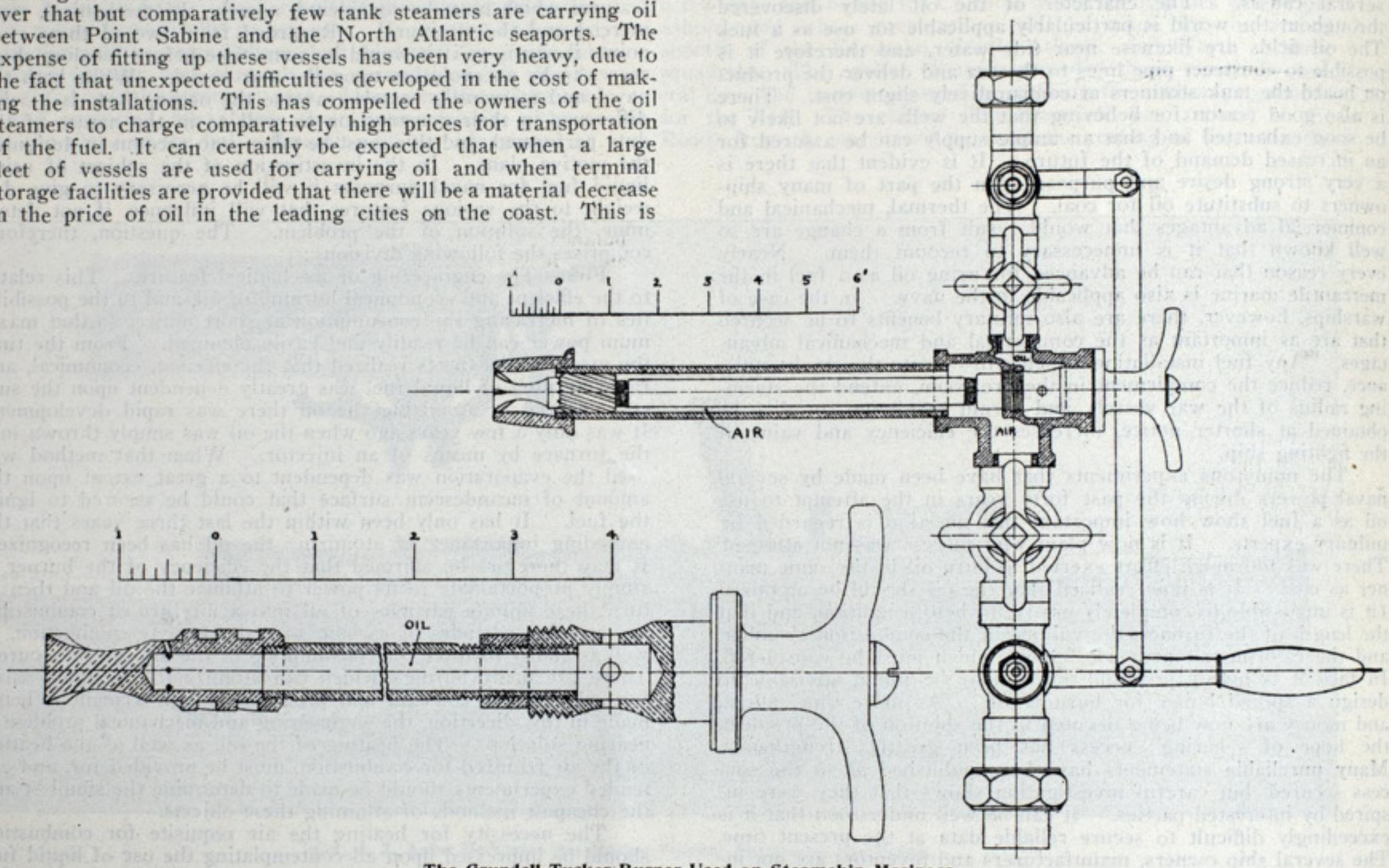
The mecnanical method of introducing the oil was so inefficient in the past that even experts were not able to burn the amount of oil desired. It has always been possible to burn some oil and to secure nearly the full thermal efficiency of the combustible. The great difficulty in the past was due to the fact that no one seemed to know how to burn enough oil and yet have it under control. There is therefore no record that, previous to two years ago, any boiler ever evaporated the amount of water with oil as a combustible that was secured under forced-draft conditions with coal as a fuel. Stated in another way, the boiler could not be forced with oil to the same extent as with coal. The experiments conducted by the liquid-fuel board have shown that it is now possible to force the combustion of oil, and that the greatest evaporation per square foot of heating surface secured with coal can be greatly exceeded by an oil-fuel installation of modern design where provision has been made for atomizing the combustible and heating the air and oil. Continued experiments should therefore be conducted under government supervision.

The liquid-fuel board has already secured valuable information upon most of these points. A great service will be rendered the engineering interests of the country if further experiments can be conducted under the auspices of disinterested officials of the navy, who, by reason of their training and experience, should be particularly qualified to carry on such tests. The engineering or mechanical features of the problem will undoubtedly be solved

in a degree materially satisfactory to maritime and manufacturing interests, if not to naval experts, by further experimental work of the character that has been performed.

QUESTION OF COST AND SUPPLY CONSIDERED.

Second—The commercial feature. This relates to the question of cost and supply. It may be regarded as a certainty that, except wherein unusual conditions prevail, the cost of oil for marine purposes will generally be greater than that of coal. The cost is even now less for vessels departing from the gulf and California seaports, but the rule will hold elsewhere. While the question of cost should be of secondary importance in military matters, it must be taken into consideration in industrial matters. It is the expense of transportation that now prevents the oil from being a cheap combustible for marine purposes, but this disadvantage ought to be soon removed. While it may be put on the tank steamer very cheaply at ports like Point Sabine, its commercial value will be determined by the cost of delivery at commercial and maritime centers. This feature of the problem is beyond the ability of the navy to control, but it must be regarded as an important phase of the subject. In considering the matter of cost the fact should be remembered however that but comparatively few tank steamers are carrying oil between Point Sabine and the North Atlantic seaports. The expense of fitting up these vessels has been very heavy, due to the fact that unexpected difficulties developed in the cost of making the installations. This has compelled the owners of the oil steamers to charge comparatively high prices for transportation of the fuel. It can certainly be expected that when a large fleet of vessels are used for carrying oil and when terminal storage facilities are provided that there will be a material decrease in the price of oil in the leading cities on the coast. This is



The Grundell-Tucker Burner Used on Steamship Mariposa.

a very important commercial phase of the question, and should be carefully considered in determining the probable relative value of the two combustibles in the early future. It is undoubtedly a fact that the transportation charges per mile for oil at the present time are excessive compared with the freightage for coal, and this incongruity of expense account against oil can not continue much longer.

As regards the question of supply, it may be more expensive if not difficult to transport and to store oil than coal. The fumes of all petroleum compounds have great searching qualities, and therefore, extreme precaution will have to be taken to guard the storage tanks. If it be true that for military purposes it is best in time of war to keep all reserve fuel afloat, then liquid fuel is at a disadvantage in this respect. The mining and railroad companies have invested so heavily in the coal industry, and the transportation facilities have been so perfected, that it is now possible to deliver a cargo of coal at any point in the world. There has been, likewise, a development in the method of loading and unloading cargoes of coal. Since it will require progressive development to perfect the transportation and the storage of oil, and as the world's supply is still an unknown quantity, it will be some time before there may be a reserve supply of oil at the principal seaports. It must also be remembered when considering the problem of supply, that the naval vessel must be kept in readiness for orders to proceed at any time to any port within her steaming radius. The merchant vessel steams between regular seaports, where it would not be difficult to induce merchants to keep a supply of oil as soon as there is a regular and constant demand for it. The question of supply for battleships and cruisers may therefore not only be a commercial affair, but prove to be a military problem, since the oil requirements of naval vessels for service conditions might only be met by the government establishing oil-fuel stations. The military aspect of the question may prove to be a serious problem, since it not only necessitates heavy expenditures, but it may involve the greater question as to the wisdom of maintaining a complete chain of fuel stations between country and colony.

Third.—While the engineer may be most interested in the mechanical features and the ship owners in the commercial aspect, the constructor will meet with difficulties in solving the structural problem relating to the installation of oil fuel on board ship. The structural feature of the battleship may prove a serious detriment to the installation of an oil-fuel appliance. The problem of storing oil on board war ships which possess protective decks is much more complex than the problem of its storage in vessels of the merchant marine. Everything on board the battleship is subordinated to making the vessel a gun platform. There are many more compartments in the war vessel than in the merchant ship. In all probability the great bulk of the oil in the warship would have to be kept in the double bottoms. As the petroleum vapors are quite heavy, it may be a difficult matter to free these compartments of explosive gases, especially when the compartments are partly empty. By reason of the great number of electrical appliances in use on board the war ship, thousands of sparks are likely to be caused, any one of which might cause an explosion and set the oil-fuel on fire. Our limited experience with submarine boats may give us an object lesson as to the ability of hydrocarbon gases to explode. In the merchant service the oil is often stored in expansion tanks or trunks which rise to the height of the deck, and on some of the vessels there is a cofferdam around these tanks so that any leakage of oil can be quickly discovered. It is also a comparatively easy matter to free such tanks of any dangerous gases that may accumulate. Inspection of the tanks at all times can also be readily accomplished.

In view, therefore, of the more difficult conditions under which the oil will have to be carried in the naval service, the structural features are certain to have an important bearing upon the question as to whether or not an oil installation is possible in large ships of war. The bureau is not inclined to be pessimistic in regard to the successful solution of the problem. It believes that it is expedient to frankly state the difficulties that are likely to be encountered, so that every means can be considered for overcoming them.

OIL SHOULD BE INTRODUCED IN THE TORPEDO FLOTILLA.

The bureau has no hesitation, however, in declaring that in view of the results already secured by the liquid fuel board an installation should be effected without delay on at least a third of the torpedo boats and destroyers. The junior officers of the service are very much interested in the matter, and if several boats are equipped entirely with oil-fuel appliances, a spirited and keen, but friendly, rivalry will be created which will result in a material increase in the efficiency of the torpedo boat flotilla. Such an installation would also permit a competition to be estab-

lished between the boats using coal and those using oil, and this would be another incentive to cause systematic and careful study of the subject upon the part of all connected with the torpedo fleet.

The data which have been secured by the liquid fuel board will be exceedingly appreciated in maritime and industrial circles. A careful analysis of these data will show how complete it is and how carefully it has been collected. Although the experiments have only been in progress for a short time, practically every engineering principle that enters into the oil-fuel question has been touched upon by the board. The tests that have been conducted have been of such a diversified nature, and so many deductions can be made, that other experiments will now be enabled to ascertain in what direction research should be carried on to secure further definite information. The completeness and character of the experimental plant has probably never been surpassed, and it is due to this fact that the data collected will command attention in the engineering world. While the information secured may not hasten the introduction of oil as a fuel in armored cruisers and battleships, it will materially increase oil-fuel installation in ships of the merchant marine and in shore establishments.

It is the engineering or mechanical feature which is of commanding importance in the industrial or mercantile marine world. The structural disadvantages which are so serious as regards naval development will only be encountered in a less degree in ships of the mercantile marine. The structural disadvantages that may prove so serious in the navy will not be encountered in the installation of liquid fuel appliances in shore establishments. The insuring of a reserve supply of the fuel ought also to be a less serious problem for industrial plants. It should therefore be understood that the naval problem is distinct unto itself, and that while the experiments so far conducted show that an installation on a battleship is a serious question, the tests also prove that for manufacturing purposes crude petroleum is in many respects an incomparable fuel. Probably not over a fraction of 1 per cent. of the oil used as fuel would be consumed by the navy; and therefore, while further investigation may be necessary to show the adaptability of oil for large war vessels, the tests already conducted will be of great value and afford considerable information to all present consumers of liquid fuel, as well as to those contemplating the installation of oil-fuel appliances.

The engineering information which is being obtained by the liquid fuel board will secure increased efficiency of the motive power of the naval stations in the future, and also conduce to the benefit of the torpedo boat flotilla. It will also afford another illustration of the manner in which the industrial world has been aided by naval experimental research.

The data collected during the official oil tests should be compared with the results secured under the same boiler when coal was used. The evaporative efficiency, as well as the ability to force the boiler with two kinds of fuel, can thus be compared and the engineering advance that has been made of late can best be appreciated. It will be mainly by reason of the fact that this comparative data is obtainable that important conclusions can be drawn from the information already secured.

The bureau submits a copy of the report of Lieut. Ward P. Winchell, as to the performance of the steamer Mariposa, when using oil exclusively under her boilers in making the round trip between San Francisco and Tahiti. The bureau also submits a copy of the preliminary report of the liquid fuel board.

VOYAGE OF THE STEAMSHIP MARIPOSA USING OIL FUEL.

The following is a description of the steamer Mariposa, of the Ocean Steamship Co., as fitted for oil-fuel burning, with an account of the preliminary trial trips of the vessel as witnessed by Com'dr. H. N. Stevenson, United States navy; also the report of Lieut. Ward P. Winchell, United States navy, who officially represented the department on the round trip of the steamer between San Francisco and Tahiti:

The Mariposa is a single-screw iron steamer, built at the yard of William Cramp & Sons, Philadelphia, in 1883. She has just had new engines and boilers installed by the Risdon Iron Works, San Francisco. The oil-burning plant has just been installed by the same company. This vessel has been employed in the Pacific trade, and is now running to Tahiti from San Francisco, making the round-trip voyage of 7,320 knots each month.

Gross tonnage	3,160
Length between perpendiculars, feet	314
Beam, feet	41
Mean draught, feet	22
Depth of hold, feet	17 3/12

There is a single bottom with four watertight athwartship bulkheads, and two masts, square-rigged on the foremast. The total crew was formerly eighty-one, but since the change from coal to oil burning sixteen men have been taken out of the engineer's force, reducing the crew to sixty-five men and making the engineer's force for oil burning twenty men, as follows: One chief engineer, three assistant engineers, three oilers, one electrician, one attendant for ice machine, one attendant for air compressor, three water tenders, six firemen, one storekeeper.

There is one triple-expansion engine of the inverted direct acting type, with cylinders 29 in., 47 in. and 78 in. by 51-in. stroke, designed for 2,500 I. H. P., fitted with piston valves on the high-pressure and intermediate-pressure, and slide-valve on the low-pressure cylinders, all driven by link motion. The condenser is part of the back framing. The cylinders are not jacketed. The air, feed and bilge pumps, of which there are two sets, are driven from the forward and after crossheads. The centrifugal circulating pump is driven by a separate engine. The four-bladed propeller is 16 ft. 6 in. diameter and has a pitch of 23 ft. There are three cylindrical tank boilers placed fore and aft in the line of the ship—two are double ended, 15 ft. 3 in. diameter by 17 ft. 3 in. long, and one single ended, 14 ft. diameter by 9 ft. 9 in. long, the latter placed amidships forward of and worked from the forward fire room. Each double-ended boiler has six corrugated furnaces. The double-ended boilers have a common combustion chamber for opposite furnaces, while the single-ended one has a common combustion chamber for its three furnaces. There is one smokestack for all the boilers. The combustion chambers of the double-ended boilers have a brick bridge wall, and the back sheet of the single-ended one is covered with fire brick. The decision to use oil in place of coal was not made until the changes in engines and boilers were well under way, and it was decided to put the ship on the route to Tahiti. The steam pressure is 180 lbs. There is one auxiliary boiler, two-furnace return-tube type, in upper fire-room hatch, and fitted to burn coal only.

THE OIL TANKS.

These were constructed out of the old coal-bunker space forward of the boilers, and as the steamer is intended to carry oil for the round trip of about 7,320 miles some additional space had to be taken from the fore hold. They are arranged as follows: Just forward of the boiler space a solid watertight bulkhead, well braced, was built from the berth deck to the single bottom of the ship, extending to the single skin of the ship, from side to side; 4 ft., or two frame spaces, forward of this was also built another similar solid bulkhead, which formed the after ends of the oil tanks; 48 ft. farther forward another similar solid bulkhead was built to form the forward ends of the oil tanks, and 4 ft. forward of this another solid bulkhead. The spaces of 4 ft. at each end of the tanks being a cofferdam space to catch any oil from leakage or accident, these cofferdam spaces can be filled with water if necessary. The tank space is divided into six tanks by a middle bulkhead and two side partitions. Splash plates to break the impact of rolling are placed in each tank, a small opening at the top allowing any accumulation of gas to pass off to ventilating trunk. Small openings at the bottom allow free communication for the oil. Along the top of the tanks is provided an expansion head or trunk, being 4½ ft. high and 4½ ft. wide. Over each a ventilating trunk connecting with the top of each tank extends up to about 5 ft. above the hurricane deck, fitted with cowls, one tube reaching to near the bottom to carry off any heavy gas that might accumulate there. From the upper deck the sounding pipes to each tank are reached. There are no pipes in or through the tanks except those connected with the oil service. The total capacity of the tanks, exclusive of expansion trunk, is 6,338 lbs. of oil—about 905.43 tons. One barrel of oil equals 42 gallons.

To fill the tanks, on the port side outside the ship a 6-in. hose connection is fitted; from this a pipe leads to the forward fire room where the tank oil pump is placed. This pump, horizontal duplex, steam cylinders, 9 in., oil cylinders 8½ in., stroke 10 in., can be used to draw its supply from the pipe and deliver into each of the tanks, or by using by-passes, which are provided, the oil barge alongside can fill all the tanks; an overflow pipe from each tank, carried at height of the deck above them, leads to an overflow outside the ship near the supply hose coupling. There are two service or settling tanks placed in pockets formed on either side of the single-ended boiler. They are reached by doors from the forward fire room; each of these tanks holds about twelve hours' supply. They are filled by the oil-tank pump and have overflows back to the main tanks, ventilating tubes lead from near the bottom of the pockets in which they are placed to the smoke stack. Each service tank is provided with glass gauges by means of which the amount used every hour or watch can be easily measured. Each settling tank has two suction pipes, one at bottom to draw off water if necessary, the other at a height of about 2 ft. for the oil supply to the service pumps. All the tanks are provided with manholes to reach the interior.

PUMPS, AIR COMPRESSOR, ATOMIZER, ETC.

The oil-service pumps, of which there are two, horizontal duplex, steam cylinders 6 in., oil cylinders 4 in., and stroke of 6 in., one being large enough to supply all the burners, are placed in the forward fire room on either side. They draw their supply from the settling or receiving through removable strainers placed so they can be easily changed for cleaning, and discharge into the bottom of the small heating tank near them where the oil is heated by a steam coil to not more than 150° Fahr., and thence by a pipe to the burners. The air from the compressors, under a pressure limited to 40 lbs., discharges into the top of the heater tank on its way to the burners, so that the oil and the air go to the burners under the same pressure. The heater tank is provided with glass gauges, also a float to work a telltale and automatic control of oil-supply pump.

The air compressor is placed in a pocket off the upper engine room platform, and consists of duplicate steam and air cylinders connected to a crank shaft carrying a fly wheel turning between the cylinders. Either set is large enough to supply all the air necessary. The air compressor is horizontal, double-acting,

duplex. Air cylinders 22 in., steam cylinders 12 in. diameter, by 18-in. stroke for all cylinders. Capacity equals 1,000 cu. ft. of free air per minute compressed up to 30 lbs. at 120 revolutions per minute. Air is used at the heat of compression, or is heated by the air heater.

The atomizer, for which patents are pending, is the joint invention of Messrs. Grundell and Tucker, San Francisco. The atomizer shown herewith, consists of a hollow plunger for the oil, screwed into a pipe through which the air passes. The outlet for the oil is through a series of small holes at right angles to the central hole, the air meets the oil through spiral directors and is sprayed into a rose shape by the expanded end of the atomizer. The air and oil pipes have globe valves to regulate the supply of either, also plug cocks connected together to a handle by means of which each burner can be shut off immediately, in case of necessity, a slow-down bell, or other cause. The air-supply pipe is also connected to the steam line so that steam can be quickly substituted for air, if desired. The length of the oil plunger is adjustable, to give the best form to the rose-shaped flame. Two burners are fitted to each furnace.

A part of each furnace front is a hollow iron casting through which the air passes on its way to the atomizers and becomes heated. The chamber surrounding the burner is lined with a crucible lead lining; a by-pass to the burners is provided for use in case of accident to the heater. The lower part of the furnace front is a door on hinges that can be fastened open at any desired degree to give air for combustion. There are also two louvres in the door for the same purpose. Near the front of the furnace inside the door is placed a brick wall made to deflect upwards the inward current of air to meet the rose-shaped flame from the burners. There is ample space over the brick wall for a man to enter the furnace through the ash-pit door. The double furnace combustion chambers have a brick bridge wall reaching above the top of the furnaces, and in the single-ended boiler the common combustion chamber has the back sheet covered with fire brick to protect it.

THE TRIAL TRIPS.

Two trial trips with the vessel under way were made on July 5 and 11, the vessel being under way about eight hours each day, running from the vessel's dock to the Farallone islands and return, and were made for the purpose of ascertaining if the oil apparatus, the new engines and boilers, were in good working condition. On the first run the boilers primed badly, owing to the construction dirt not having been thoroughly cleaned out. Before the second run they were cleaned and worked well on this run. The strainers on the oil supply pipes were not finished and considerable trouble was found with dirty oil which clogged the burners. Neither the telltale to show the height of oil in the heater tank, nor the controlling device for the oil service pump were fitted, not being finished in time for use. No attempt was made to measure the amount of oil burned, nor to attain the maximum speed, and it was therefore impossible to obtain any data other than observation of the working of the oil apparatus. Very few of the fire room force had ever had any experience with oil burners on steamers, and one object of the trials was to give the force practical experience. When properly regulated the burners gave no smoke, but that they were not properly regulated is shown by the fact that more or less smoke was visible most of the time, and at times dense black.

Owing to lack of the telltale and regulating device of the small heating tank the pump tender once allowed this tank to fill up and the oil to flow over into the air pipe and flood the burners. As soon as this was discovered every burner was immediately shut off by means of the lever connecting to the plug cocks on the oil and air supply pipes at the burners. The atomizer tubes were unscrewed and on some of them, where the oil had caked, considerable force had to be applied to pull them out. New, clean atomizers were screwed in, and as soon as the oil heater tank could be brought to the proper oil level the burners were started again. Some steam pressure was lost during this delay, but the engines did not stop nor slow down very much; some of the burners were started in a few minutes and all of them in not over fifteen minutes. The value of being able to shut off the oil and air quickly and clean or substitute other atomizers was shown by this mishap. The burners made considerable roaring noise, and the air pressure was, in order to clean the burners from dirt, carried at about twice the intended pressure, owing to the lack of the strainers which allowed dirty oil to choke them, and they had to be taken out frequently for cleaning. By shutting off with the lever the regulating valves were left in adjustment for starting the fire again provided it was right before. The new fire is started by a torch inserted into the plug hole around the burner.

On the second run the strainers and regulating device for the heater tank had been completed. The oil apparatus was handled with greater ease and uniformity, and the less amount of smoke was very noticeable. For intervals of an hour or more scarcely any or none would be observed. On the run in from the Farallones the engine was speeded up to seventy-four to seventy-seven turns, and an average speed of 14¼ knots was obtained. The steam pressure was uniformly maintained at the point desired without difficulty, and the oil-burning apparatus gave no trouble whatever and worked well. The oil used on both runs was from the Kern river district, near Bakersfield, Cal. The following data was observed:

Steam pressure, pounds	160-170
Revolutions of engine	74-77
Revolutions of air compressor	60
Pressure of air, pounds	20
Temperature of oil entering heater, degrees F.	80
Temperature of oil leaving heater, degrees F.	120-130
Temperature at base of stack, degrees F.	750

It is regretted that the nature of the trials did not permit of obtaining a greater amount of data beyond observing the apparatus in use. The chemist at the New York yard submitted the following report upon the sample of the Kern river district oil sent him for analysis:

"The sample is practically free from low boiling naphtha, as on distillation only a small percentage passed over below 150° C., and less than 10 per cent. below 225° C. A boiling point above 360° C. was reached before the second 10 per cent. was collected. It shows on ultimate analysis the following composition: Carbon, per cent., 04.43; hydrogen, 10.99; nitrogen, .65; sulphur, .59; Oxygen, 3.34. This gives a calorific value, by Dulong's formula, of 18,806 B. T. U. The specific gravity at 60° F. is 0.962; flash point, 228° F.; fire point, 258° F.; vaporization point, 178° F.; loss for six hours at 212° F., 12.01 per cent."

REPORT OF LIEUT. WARD WINCHELL ON THE VOYAGE OF THE MARIPOSA.

"In accordance with the department's telegraphic order of July 7, 1902, delivered July 8, 1902, and the instructions from the bureau of steam engineering, dated July 7, delivered a few minutes before sailing, I took passage on the Oceanic Steamship Co.'s steamer Mariposa, leaving San Francisco at 10 a. m., July 15, 1902, for the round trip to Tahiti. In accordance with the instructions of the bureau, I took two sets of indicator cards each day, making 45 sets in all, the data of which were worked up. There have been no tests to determine the evaporative efficiency of the two main double-ended boilers used on the run, and I regret to report that the chief engineer of the ship was unable to improvise any apparatus by which the amount of feed water could be determined with accuracy enough to give data of any value.

"The amount of oil is a matter of much importance, since the tanks hold barely enough to make the round trip and but one day's supply of coal is aboard. The oil was measured first by the amount pumped into the two settling tanks, as shown in inches on the scale back of the gauge glasses on the tanks; second, this amount was checked by the number of inches used out of each tank for each watch; third, another check, and the one considered most accurate as dealing with large quantities and small errors, was by sounding the tanks from time to time and comparing the amounts taken out with the expenditures in the log. The latter method gave a correction which was applied to the daily log, increasing the daily expenditure slightly, as summed up by inches in the settling tank.

"The most careful inspection at Tahiti failed to show any bad effect of the flame upon the boilers. No leaks or defects developed anywhere about them and there was no difficulty at any time in feeding them. As I was ordered to the Boston immediately on my arrival at San Francisco I lost the opportunity of again inspecting the boilers, but no defects showed from the outside. At Tahiti the tubes were swept by tube scrapers, and back connections, uptakes, ash pans, and furnaces were cleaned. All the refuse from these various places barely filled two ash buckets. This refuse, mainly soot, was the result not only of the twelve days' run to Tahiti, but also of the three preliminary trials by the contractors. The first one, a four-hour trial of engines and boilers, was made with Comax coal, and the other two were free runs at sea, of about eight hours' duration each, burning oil. The tubes had never been cleaned previous to arrival at Tahiti. It is the intention hereafter to make the round trip of twenty-four days' steaming without sweeping tubes.

"There are no precautions other than those usually taken on board ship to guard against fire or explosion. All spaces to which oil has access are well ventilated by both inlet and outlet ducts, the oil is a thick, dark fluid, like molasses, and in the open air burns slowly, giving off much smoke. But it gives off volatile gases which form explosive mixtures with air, tanks empty, or nearly so, being more dangerous than full ones in this respect. The ship is electrically lighted, but in addition an open hand lamp is burning in the fire room all the time to light the burners; the firemen smoke on watch, and the oil is treated no more tenderly than if it were coal. On the run back, the cargo of copra was stored all about the expansion trunk, which projects up 4½ ft. between decks, completely covering the tanks and making them inaccessible for examination.

"Of the six firemen, three were relieved from watch the second day out, leaving but one man on a watch to fire twelve furnaces in two different fire rooms separated by the length of the double-ended boilers. The water tender did not touch the boilers except in emergency, his duty being to 'tend water, fill settling tanks and record height of oil in them, record temperatures of oil at settling tank and in heater of fire room and of superheated air, take reading of lower pyrometer where the two uptakes meet, and run oil pump supplying oil to the settling tanks and small oil pump supplying oil to the oil heater.

"As a coal burner the Mariposa formerly had the following engineer force: One chief engineer, three assistant engineers, three oilers, twelve firemen, twelve coal passers, three water tenders, one messenger, one storekeeper; total, 36. A reduction of sixteen men in the fire room force is effected by oil burning. At

General Summary of Log of Mariposa, burning oil, round trip, Tahiti and San Francisco, July and August, 1902.

Date,	Knots per day.	Knots per hour.	Revolutions per minute.	I. H. P. main engines only.	Oil used per day (barrels).	Oil used per day (tons of 2,240 pounds).	Oil used per hour (pounds).	Grate surface, two double ended boilers.	Heating surface, two double-ended boilers.	I. H. P main engines per square foot of grate.	I. H. P. main engines per pound of oil per hour.	Square feet of heating surface per I. H. P	Pounds of oil per hour per I. H. P.	Pounds of oil per knot run.	Knots made per ton of oil.	Knots made per barrel of oil.	Slip of screw in per cent.	Actual time.
San Francisco to Tahiti.																		*h. m.*
July 16	289	12.08	58.74	1,475	258	36.86	3,451	258	8.302	5.64	0.427	5.63	2.33	286	7.84	1.12	9	23 55
July 17	298	12.3	61.1	1,768	260	37.14	3,438	258	8 302	6.85	.51	4.70	1.94	279	8.02	1.15	11	24 12
July 18	302	12.5	62.5	1,950	260	37.14	3.438	258	8,302	7.55	.57	4.25	1 76	275	8.13	1.16	12	24 12
July 19	311	12.8	63.4	1,864	260	37.14	3.440	258	8,302	7.20	.54	4.44	1.84	267	8.38	1.20	10.4	24 8
July 20	285	13.1	65.7	2,200	230	32.86	3,484	258	8,302	8.50	.63	3.77	1 58	258	8.67	1.24	12.1	21 7
July 21	321	13.26	65.6	2,398	235	33.60	3,133	258	8,302	9.80	.76	3.60	1.30	234	9.55	1.36	10.8	24 11
July 22	306	12.6	65.8	2,270	255	36.43	3,365	258	8.302	8.80	.67	3.66	1.48	270	8.40	1.20	15.5	24 15
July 23	307	12.5	65.7	2,240	240	34.30	3,200	258	8,302	8.70	.70	3.70	1.43	253	8.95	1.28	15.7	24 27
July 24	335	13.8	68	2,386	250	35.71	3,299	258	8,302	9.20	.72	3.60	1.39	239	9.35	1.34	10.7	24 16
July 25	351	14.5	69.8	2,470	257	36.71	3,398	258	8,302	9.57	.72	3.35	1.38	234.8	9 59	1.27	8.3	24 11
July 26	333	13.9	69.1	2,129	258	36.86	3,432	258	8,302	8.25	.65	3.90	1.61	244.6	9.03	1.29	11.7	24 3
Total	3,438				2,803	400.43												262 57
Average		13.12	65.2	2,193	254.8	36.40	3,412	258	8,302	8.593	.643	3.786	1.556	260.9	8.585	1.22	13.14	
Tahiti to San Francisco.																		
August 1	298	12.6	65.3	2,172	240	34.3	3,222	258	8,302	8.42	.674	3.82	1.49	258	8.7	1.24	15.6	23 50
August 2	323	13.6	70.1	2,490	280	40	3,774	258	8,302	9.65	.66	3.33	1.51	277.4	8.08	1 15	15.	23 44
August 3	322	13.6	70.1	2,646	280	40	3,772	258	8,302	10.24	.70	3.14	1.428	278.2	8.85	1.15	15.	23 45
August 4	334	14	71.3	2,785	290	41.43	3,954	258	8,302	10.8	.704	2.98	1.42	277.8	8.06	1.15	13.	23 46
August 5	357	15.04	72.4	2,892	305	43.57	4,111	258	8,302	11.21	.703	2.87	1.39	274	7.96	1.14	9.	23 44
August 6	346	14.6	71.9	2,772	310	44.3	4,177	258	8,302	10.8	.66	3.	1.50	287	7.8	1.11	10.	23 45
August 7	322	13.5	71	2,777	310	44.3	4,177	258	8,302	10.7	.66	2.98	1.50	308	7.27	1.04	15.7	23 45
August 8	343	14.4	71.9	2,936	315	45.	4,207	258	8,302	11.38	.698	2.83	1.402	297	7.62	1.09	11.3	23 43
August 9	327	13.7	69.4	2,553	305	43.57	4,109	258	8,302	9.89	.621	3.212	1.606	295.4	7.272	1.07	12.6	23 45
August 10	347	14.6	72.9	2,863	320	45.71	4,313	258	8,302	11.10	.663	2.90	1.507	295.1	7.60	1.084	11.7	23 44
August 11	341.1	14.8	73.54	2,968	322	46	,480	258	8,302	11.5	.663	2.79	1.51	302.8	7.407	1.06	12.	23
Total	3,660.1				3,277	468.14												260 31
Average		14.05	70.91	2,770	302	43.18	4,026	258	8,302	10.73	.688	3	1.45	286.3	7.818	1.111	12.8	
Total knots	7,098.1				6,080													
Average, two runs	3,549	13.58	68.05	2,481	278.4	34.29	3,719	258	8,302	9.661	.665	3.393	1.503	273.6	8.201	1.165	12.97	
Average speed made during round trip.	325.7																	

NOTE.—For convenience in comparing with engineer's log, the day is taken from noon until n on. July 16 begins at noon July 15 and ends noon July 16. This leaves but two hours' run on July 15, which was thrown out of the calculations. The average indicated horse power of main engines was got not by averaging the daily runs, but by taking average revolutions for the eleven days' run, and taking the cards near these revolutions as a basis in computing the horse power.

July .0 stopped 2½ hours to plug leaky tubes in condensers; July 25-26, jib and fore try ail set, trade wind port beam; Aug. 7, strong head wind and sea; Aug. 8, wind and sea moderate ahead.

sea she needs now but three firemen, but carried six. This would reduce the force by nineteen men.

"Temperatures of fire rooms seem to be about one would expect in coal burning, but the temperature of the uptake and smoke pipe gases run high, the maximum being 925, which shows an undue loss of heat here. The temperature of the oil in the settling tanks ranged between 68° and 100° F. on the trip out and between 90° and 108° F. on the trip back. The oil auxiliaries comprise one large oil pump, two small oil pumps, two oil heaters, one air compressor, and four strainers. There is a steam pipe connection to blow out the oil strainers, and another one to blow out the oil burners when clogged.

"On Aug. 3 the air compressor needed overhauling, and steam atomizing was kept up for two and one-half hours until the compressor was again working. During this time the evaporator supplied enough feed water to use twenty burners; the engines were not stopped while shifting from steam to air atomizing, and averaged 67.8 turns for the two and one-half hours. They had before been making seventy turns. Also during the four days in port at Tahiti the forward main single-end three-furnace boiler was used, atomizing with steam. Generally two burners in the middle furnace gave ample steam to run the following auxiliaries, all exhausting into the atmosphere, the boiler being fed with fresh water from the dock: Ice machine, dynamo, flushing pump, feed ejector, two cargo winches, small portable steam pump, and steam for cooking, bath tubs, etc.

"At first two firemen and a water tender were on watch at a time, each fireman having one fire room of six furnaces or twelve burners. The men had but little experience, combustion was poor, much smoke was made, much oil burned, and poor speed attained. To locate the responsibility for bad adjustment of burner valves, but one fireman was put on at a time to attend twelve furnaces (twenty-four burners). This made an improvement in the combustion. Unfortunately, the top of the funnel can not be seen from either fire room, and while the firemen can tell by the appearance of the flame as shown in the sight-hole, or even by the roar of the burner, when the combustion is perfect, in designing a boiler room for liquid fuel the ventilators should be so arranged that a view of the top of the smoke pipe can be had from each fire room. The work of the fireman would be even easier than it is and better results attained if the oil and air pressure is kept constant and the heated temperature of the oil constant. The apparatus then, once properly adjusted, would need very little change. To get these results is a mere matter of detail easily arranged. If the temperature of the oil rises it feeds more freely and a readjustment is necessary, and the same conditions hold with regard to the pressure.

"In addition to the independent oil and air supply valves the burners are fitted with an air plug cock and an oil plug cock connected to one lever, which then controls both air and oil supply, enabling the operator to shut them both off at once in emergency. At first when steam went up too high and a burner was shut down this lever was used; but shutting off the air thus gave the air compressor less work, and as its governor is not sensitive the air pressure increased, making a readjustment of all oil and air supply valves necessary, with consequent smoke. Later on, when it was desirable to shut down a burner, the oil alone was shut off by the independent feed valve on the burner, and the untouched air valve kept the air compressor's work more nearly constant; then when the burner was again required, the oil valve was opened and immediately lighted from the flame of the adjacent burner.

"In starting fires with everything cold, steam is raised on the auxiliary boiler, which burns coal, and the air compressor, oil pumps and oil heater are started. The oil is lighted by inserting oil-soaked rags in the air space surrounding the burner and touching a lamp to them, or an arrangement like a gas lighter may be used. Sometimes when the air pressure is too high, or insufficient oil is feeding, the flame flickers and may go out. If the oil is kept feeding under these conditions, on relighting there is a small explosion of the gases in the furnace, with a momentary back draft through the peep-holes and ash pans.

"When shut down July 19 for two and one-half hours plugging condenser tubes, one burner at each end of each boiler (four burners in all) furnished steam to run all auxiliaries, including feed pump, bilge pump, air compressor, ice machine, dynamo, and flushing pump, all of which are exhausting into the atmosphere. During the four days in port at Tahiti the forward main single-end three-furnace boiler was used, atomizing with steam. Generally two burners in the middle furnace gave ample steam to run the following auxiliaries, all exhausting into the atmosphere, with boiler fed from fresh water on the dock: Ice machine, dynamo, flushing pump, feed injector, two cargo winches, and small portable steam pump.

"In the Grundell-Tucker burner (see illustration) the oil, heated by a steam coil under boiler pressure throttled down, passes through the inside pipe and is thrown out radially through the series of small holes. The air, first heated by compression up to 20 lbs., is further heated to a temperature of about 350° F. in the air chamber surrounding the burner, and called the air superheater. Air can be used at the temperature at which it leaves the compressor, and was so used on the trip down until July 17, when the superheaters were connected up. This air under the pressure of about 20 lbs. surrounds the oil pipe in the burner and passes axially along the pipe until near the end, where it is given a whirling motion through small helical passages arranged like the rifling of a gun. It crosses axially and whirling through the fine oil streams spurting radially from the end of the burner, breaking up the oil into fine spray, the drops of which can be seen before they ignite. A further air supply (cold) is admitted through the hinged door of the ash pan, and is directed up across the path of the flame and heated

also by a curved fire brick wall built in the ash pan close to the front. This ash pan door is not moved much, but the regulation of the air supply is by the valve control of the air and oil in the burner. The flame should be a steady, full, white or yellowish white one, filling the furnace.

The principal difficulties encountered were in the regulation of the supply of oil to the heaters by the pump and the consequent variation of the temperature of the heated oil and the freedom of flow through the burners. An automatic submerged float, arranged like a steam trap and fitted in the oil heater to control the throttle of the pump, failed to give good automatic results, and the supply of oil was regulated by hand. If the oil is heated too much (above 150° F.) some of the volatile gases are given off and mingle with the air pressing on top of the oil in the heater, thence passing with the air into the air superheaters and burners, the result being that on one occasion a heater got red hot from this cause. Another difficulty was due to the choking of the strainers by foreign matter and impurities in the oil, shutting off the supply of oil, and on one occasion, Aug. 10, putting out all the fires. Just previous to the fires going out, and while the usual air supply was on, and an insufficient amount of oil being fed, a dense white smoke like steam arose from the funnel. This strainer difficulty will be solved by fitting the strainers in pairs, so that a clean one can always be switched in while the choked one is being cleaned. Generally the revolutions of the engines did not vary much during the day, and in calculating the horsepower for each day's average revolutions, when the cards for that day differed much, the set was selected whose revolutions were near the average for the day with the indicated horse power, assumed to vary as the cube of the revolutions. If the two sets of cards for the day had the same number of revolutions their average indicated horse power was used as a basis to compute the day's horse power as before.

"The speed was much higher on the return trip than on the outgoing, which is ascribed partly to the better combustion as the firemen got experience, partly to the overhauling of the bearings at Tahiti by the force on board, and mostly to the increased oil consumption allowed after the run down had proved that there was plenty of oil for the return trip, which was a matter of some doubt before, the ship being provided with coal for twenty-four hours to cover possible emergency. Full power was not developed in the two boilers used, as schedule time was easily exceeded with from two to four burners shut off, though it would not appear, from the tabulated results, that the indicated horse power would equal what can be got by a good system of forced draft. This burner, however, works well with the Howden system of forced draft, as seen on the tank steamer George Loomis.

"It must be remembered that the tabulated calculations are all based on the indicated horse power of the main engines only, as it was considered better to use only data actually obtained, and afterwards estimated data, such as indicated horse power of auxiliaries, could be applied without vitiating the observed data and results. No cards could be taken from any of the auxiliaries, but careful estimates give the following results:

	I. H. P.
Air compressor, at 60 revolutions per minute	110
Auxiliary feed pump and two oil pumps, one in intermittent use	30
Dynamos	30
Ice Machine	7
Circulating pump	5
Flushing pump	2
Baths, steam tables, evaporator, cooking, etc.	11
Total	195

"The steering engine is not used except near port. The size of air compressor was based on the assumption that it requires 1 cu. ft. of free air for every pound of water evaporated from and at 212° F., as shown by tests of various oil burners at Western Sugar Refinery, San Francisco. The weights of oil auxiliaries are as follows: Air compressor 9 tons; two settling tanks 12 tons; two oil heaters 2 tons; two oil pumps (small) .5 tons; one oil pump (large) 1.25 tons; fifteen superheaters (air) front 3.1 tons; all pipe, valves, fittings, ventilators etc. 8 tons.

"It should be remembered that the boilers were designed for coal burning; that the oil-burning plant was fitted in a hurry, the machinery not leaving the ship until the gong rang for people to go ashore; that the firemen were without experience in oil burning, and that most of the automatic gear did not function properly. With the air pressure constant; with the oil heated at constant temperature near 140° F.; with oil strainers arranged in pairs, so that one is always efficient, and with experience in firing, the results in economy of oil should be much better on the next trip; and the fireman's work, already very easy, will approach supervising automatic regulation. The fireman does not need strength nor previous training with coal. He should have a good eye, good ear, some common sense and a desire to learn a new and easy trade."

NOTE—A summary of the second voyage of the Mariposa also printed in the report of the chief of engineers, shows that the oil consumption on the second voyage was considerably less than that on the first, due to two causes—improvements in detail of the oil-fuel installation and increased skill and intelligence upon the part of the engine-room force.

INTERESTING POINTS IN CRUISER CONTROVERSY.

Many points of interest came out in the recent discussion in the naval board of construction over the controversy in relation to the design for the armored cruisers Tennessee and Connecticut. The displacement of the vessels was limited to 14,500 tons each, and the disagreement on the board only extended to a matter of increase of displacement of 190 tons, which Admiral Melville contended should be allowed for machinery weights over and above those prescribed by congress to insure the required power for speed. Finding that they were unable to reach an agreement, the board submitted two reports—one by the majority and the other by the minority. The majority report was presented to the chief of the bureau of ordnance, the chief naval constructor and the head of the office of naval intelligence. The minority report was presented by Admiral Melville. The decision of the navy department has been rendered, and it is in favor of the majority report, Admiral Melville himself recommending that the majority report be approved, in order that there be no delay in beginning the work of construction. The majority said, however, that if congress had not limited the displacement of these vessels to 14,500 tons, the difference might have been adjusted to the satisfaction of the minority, but to make an additional allowance of 190 tons a new design would have to be prepared, with a sacrifice of some of the important elements of the vessels, such as reduction in armament, armor or coal carried on trial.

As stated many interesting points were brought out in the discussion and conclusions of the board, some of them being made so clear of technicalities and yet showing expert treatment. The majority argued that the additional displacement of 190 tons represented 35.7 per cent. of the total weight of the battery, and 7.2 per cent. of the total armor protection; that it was greater than the weight of three 10-in. guns and mounts, or of eleven 6-in. guns and mounts; that if it were taken from the protective deck it would make necessary a reduction of its slopes from 4 to 1½ in. in thickness. Hence it is apparent how great a sacrifice of armor or armament would be necessary and to what an extent the efficiency of the vessels would be impaired if the additional weights desired for the machinery weights were taken from the objects named. In considering the question of speed the board decided upon 22 knots, believing this to be the maximum speed that could be obtained in conjunction with a powerful battery and good armored protection; and the majority maintained that experience with models of the proposed vessels in the test tanks indicated that a speed of 22 knots could be obtained with 23,000 I. H. P.

The minority report maintained that "trial displacement" is an arbitrary matter, and that when the ship should be ready for sea her displacement would be found to be as great as 16,000 tons, and that then would be the time she would need all the power designed to keep up her speed. With 25,000 I. H. P. she would make 21½ knots at this displacement, and only 20.9 knots with 23,000 I. H. P., or 1½ knots less than the Drake class of the British navy. Admiral Melville does not believe that 23,000 I. H. P. will give vessels of the Tennessee class a speed of 22 knots, and to strengthen this assertion he asserts that the Drake class, of 400 tons less displacement, require about 28,000 I. H. P. for 22 knots, and the Gambetta class of the French navy, of 12,416 tons displacement, are to have 27,500 H. P. to make 22 knots. With regard to tank tests he says that they are useful in some ways, but as a means for determining the power actually required to drive a large ship at high speed he does not consider them as trustworthy as calculation based on the performance of other vessels, of as nearly as possible the same size and power. He thinks it would be wise to reduce the weight carried in some other way than by cutting down the power of the engines and substituting machinery of lower power which was not designed for such vessels.

In preparing the scheme for these vessels it was the aim of the board to provide for vessels of maximum efficiency on the displacement authorized by law, and therefore more powerful batteries and greater protection were given to them than to any armored cruisers yet built or projected, so far as is known.

SHIP BUILDING AT SAN FRANCISCO.

San Francisco, Cal., Nov. 12.—The Hill-Jerome steamer Progresso under conversion into an oil tanker at the Fulton Iron Works in this city, will be completed about Nov. 20 and will then sail for the Atlantic coast. The vessel is under charter for five years to carry bulk oil from Texas to Atlantic coast points. The Aryle, under the same management, is also at the Fulton yard. Work on her is being pushed. This vessel is under charter to carry oil from California to Honolulu. The Melville Dollar, formerly the lake-built steamer Samuel J. Murphy, is acknowledged to be the best lumber carrier and one of the most profitable vessels on the Pacific coast. Although the lumber trade is in a prosperous condition, vessels have been built in excess of the demand and the result is that freights have fallen off. The deep-water wooden ships are not in as good demand as are large schooners of modern build which are capable of carrying a large part of their cargo on deck. The cost of operation is decidedly in favor of schooner-rigged vessels.

George B. Gilchrist, Belfast, Me., is at work on a four-masted wooden schooner for McQuestion Bros. of Boston.

SOME BOOK REVIEWS.

With the rush to Europe and the continent one is somewhat prone to overlook the fact that there are trips quite as delightful and far more romantic in other directions. For instance, the Oceanic Steamship Co.'s service from San Francisco to Samoa and return. One scarcely realizes that he can in six weeks make the round trip from New York if he is pressed for time and still obtain a fairly comprehensive view of these South Sea islands. It would be better, of course, to remain longer, but the point is that the trip can, if necessary, be made in six weeks. Life among these savage yet gentle people is a revelation. Of all the books on Samoa which have latterly come from the press one of the most serviceable is Mrs. Llewella Pierce Churchill's "Samoa 'Uma." Mrs. Churchill had exceptional opportunities for seeing Samoan life in all its phases. She spent twelve years there as the wife of the American consul, and all its dignity and all its pettiness were constantly before her. It would be impossible to write a book of more downright information of the customs and habits of the people of these islands. Of course it isn't all poetry; there are many traits to the Samoan people which are not commendable; there are also bugs and crawling things with which one desires a very short acquaintanceship; but, on the whole, life is smooth and pleasant. The book is illustrated with scenes and photographs from life which add greatly to the narrative. The book is published by the Forest & Stream Publishing Co., No. 318 Broadway, New York. There are now three Cramp-built steamers on the Samoan route, the Sierra, Sonoma and Ventura.

It is an interesting observation of publishers that books about ships and the sea sell better in the western inland states than they do on the coast, which, surprising as it may first appear, is after all, very natural. Mr. Willis J. Abbot of Ann Arbor, Mich., has written a book entitled "American Merchant Ships and Sailors," which Dodd, Mead & Co. are publishing. Mr. Abbot has already written a brief history of the United States navy. He goes back to the beginning; the ships that our forefathers built; and divides his work into three parts—the ocean, the great lakes and the rivers. His chapter on the great lakes is evidently culled from other publications and not secured by original research. It contains certain inaccuracies. It says that the iron ore traffic began in 1856 when the Ontonagon shipped 296 tons of ore at Duluth. This, of course, is an error. The canal was opened in 1855 and the first ore was shipped in that year from Marquette. Duluth was not founded for some years later and was not an ore shipping port for nearly thirty years thereafter. The book also errs in trying to be too current. It speaks of polar expeditions and leaves Baldwin at Alger island, Franz Josef land, while everyone knows that he has returned to the United States after abandoning the tour.

Mr. Clamy Emery, who is with the Gas Engine & Power Co. and Charles L. Seabury & Co., Consolidated, Morris Heights, N. Y., has written a series of little sketches of New England country folk under the title "Cap'n Titus." The book is published by Doubleday, Page & Co. of New York. The stories are all by Capt. Titus, who is quite an original character with homely wit and lots of human nature.

Johnston Bros., Grand Haven, Mich., have launched the steel tug W. H. Kinch for the Buffalo Dredging Co. She is 68-ft. long, 17-ft. beam and 9-ft. deep.

TRADE NOTES.

A letter from the Buffalo Forge Co. announces the removal of the branch office at Southbridge, Mass., to Boston, Mass., 727 Board of Trade building.

At the Dusseldorf exhibition, which has just terminated, the highest award of merit, the gold medal was awarded the "Hunt" conveyor. This conveyor is manufactured by the C. W. Hunt Co., West New Brighton, New York.

The new Peoples Line boat, now building at the Harlan & Hollingsworth works, Wilmington, Del., and to ply on the Hudson river between New York and Albany is to have wood-work of Pacific coast red cedar, the order for furnishing which has been placed with F. R. Stevens, 18 Broadway, New York.

P. & F. Corbin of New Britain, Conn., manufacturers of hardware, are making extensive changes in their plant, in order to increase their output. They have just completed a large seven-story, fire-proof building, to be used for general manufacturing purposes, and are now at work on a new foundry building to be 60-ft. wide and 600-ft. long, located on their property at the annex adjacent to the tracks of the New York, New Haven & Hartford railroad. It is expected that the building will be ready for occupancy by Jan. 1, as the masonry work is now practically completed. These improvements will necessitate the employment of 100 additional iron moulders, seventy brass moulders and 500 extra help in general manufacturing.

Following is a note from Thos. Drein & Son, boat builders of Wilmington, Del.: "Since we sold our old property to the Pennsylvania company for their elevated railroad through this city it has been reported that we were retiring from business. Of course most of our customers understand that this is not the case. We have simply moved our works across the street. We are shipping twenty-five patent beaded metallic life boats to the Pittsburg Steamship Co. of the great lakes and we are still furnishing for new lake ships all the life boats required at the different yards of the American Ship Building Co. Our eastern trade has been larger than ever this year and orders already coming in for 1903 indicate a repetition of this year's business."

The Chicago Pneumatic Tool Co. reports sales of pneumatic tools within the last week to the following concerns: Union Pacific Railway Co., Omaha, Neb.; Newport News Ship Building & Dry Dock Co., Newport News, Va.; United States navy yard, Brooklyn, N. Y.; Maryland Steel Co. Sparrow Point, Md.; International & Great Northern Ry., Palestine, Tex.; Standard Oil Co., Buffalo, N. Y.; American Locomotive Co., Brooks Works, Dunkirk, N. Y.; Baldwin Locomotive Works, Philadelphia; Seattle, Tacoma & Interurban Ry., Seattle, Wash.; Chicago, Burlington & Quincy Ry.; at their Galesburg, Ill., W. Burlington, Ia., and Aurora, Ill., shops; J. I. Case Threshing Machine Co., Racine, Wis.; New York Central & Hudson River company, Depew, N. Y.

Among the novel exhibits in the machinery department of the Mechanics Fair, recently closed in Boston, was that of the Elliott Engine Valve Co. This company is securing factory facilities for putting on the market the Elliott rotary valve. The company claims for this valve all of the advantages of the famous Corliss engine with none of its drawbacks. They say: "While being equally economical as to steam, and hence fuel, it is a hundred fold more simple in construction, inexpensive, and durable, and at the same time capable of the highest desired speed, and is perfectly adapted for locomotives, automobiles and marine engines. It is in the length of time during which the port remains wide open that the variations in expansion are obtained, not the variations in width of opening, as in the ordinary slide valve." Further information can be obtained from the company, 475 Harrison avenue, Boston.

"Get the Waterbury habit" is the novel suggestion that appears on many bright bits of printed matter from the Waterbury Brass Co., 122-130 Center street, New York. A classified stock list from this company deals with seamless brass and copper tubes, including iron pipe sizes; seamless copper tubes, 20 ft. long; seamless brass condenser tubes; Sign Brass, 8 to 30 in. 15 B. & S. gauge; sheet brass, in rolls and flat sheets, soft, half hard and hard; sheet bronze, in rolls and flat sheets, soft, hard and half hard; sheet brass, 24x48 in., soft, half hard and hard; sheet copper and bolt copper; spinning copper, in rolls; German silver, in rolls and flat sheets; hoop brass, hard and half hard; low brass, in rolls; drawn brass strips, round edges; brazed brass tubes and channel brass; brass rods, free turning stock; copper and yellow metal rods; wire, of high brass, low brass and copper; soldering coppers, etc., etc.

SHIP YARD NOTES

C. V. Minott of Phippsburg, Me., has the keel laid for a five-masted wooden schooner of the following dimensions: Keel, 240 ft.; beam, 44 ft.; depth, 20 ft.

A new stern-wheel steamer will be built by E. J. Howard at Jeffersonville, Ind., for the Nashville, Chattanooga & St. Louis Railway Co., to be used as a transfer vessel. She is to be 150 ft. long, 30-ft. beam and 4 ft. depth of hold.

The Reading railway has given the Neafie & Levy Ship & Engine Building Co., Philadelphia, an order for a new steel paddle ferryboat, to be 156 ft. long, 30-ft. beam and 13 ft. depth of hold. She is to be used on the Philadelphia and Kaighn's point run.

The Maryland Steel Co., Sparrow's Point, Md., has been awarded a contract to build a steamboat for the Baltimore, Chesapeake & Atlantic Railway Co., to be completed next spring. The vessel is to have a steel hull. She will be a duplicate of the Maryland, recently delivered to the railway company by the Harlan & Hollingsworth Co., Wilmington, Del. Her dimensions will be: Length between perpendiculars, 180 ft.; beam, molded, 34 ft.; depth, 10 ft. 1 in. Her motive power will consist of a vertical, surface-condensing beam engine with cylinder 38 in. in diameter by 9-ft. stroke.

NAVAL OFFICERS CONFER WITH THE PRESIDENT.

A conference that will probably have an important bearing on the future naval policy of the United States was recently held at the White House between President Roosevelt, Rear Admiral Taylor, chief of the bureau of navigation, and Rear Admiral Bowles, chief of the bureau of construction and repair. Admiral Taylor is vice chairman of the general board of the navy, which is devoting its efforts to improving the efficiency of the fleet with a view to having it in a thorough state of preparation for any hostile emergency. The purpose of the president in summoning Admirals Taylor and Bowles to the White House was to discuss with them several schemes proposed by the general board and by naval officers with whom the president has talked in regard to the types of vessels needed for the navy. It was evident from what the president said in the discussion that he is anxious to adopt immediately a general plan for the increase of the fleet along lines consistent with the present conditions and future possibilities, and to adhere to this policy until a sufficiently large force of ships to make the United States one of the foremost naval powers has been obtained. The president's remarks showed that he was alive to the importance of this matter and had ideas of his own which could have come only from devoting considerable thought to the subject.

While the conference was not conclusive it was made clear by the president that he is in favor of devoting the resources of the country to the almost exclusive construction of first-class fighting vessels, instead of continuing the policy of building ships of many different types. These other vessels, he believes, can wait until a sufficiently large fleet of powerful armorclads have been placed in commission.

It developed during the conference that the general board of the navy had recommended the construction of a number of small but very fast cruisers, to be used for scouting purposes in conjunction with battleship formations in time of war. The board suggested that each of these vessels be about 2,800 tons, or 300 tons smaller even than the Denver class of fast cruisers now under construction. The president had given some consideration to this recommendation, and, while he apparently arrived at the conclusion that it was based on sound judgment, he was not willing to undertake its consummation until the battleship fleet had been greatly augmented.

The construction of sea-going battleships of great range of action and capable of giving a good account of themselves in an action with the best armorclads of any foreign navy is what the president wants. He is not so particular about the speed of these vessels as he is about their armor and armament, and what he regards as quite as important, their ability to leave the United States and remain at sea, cruising for long distances, if required to do so, for a considerable length of time before being forced to return to a base to secure coal and other supplies. From what was said by the president in this particular it is believed that he will advocate in his annual message, or in other ways make known his views on the subject to congress, that authority be given for the initiation of a naval building program, which will have for its object the construction of a large number of first-class battleships of the general characteristics which he has outlined. In the course of the discussion the president mentioned that it had been represented to him that the tendency of the naval authorities was to build battleships which were too large and unwieldly. He wanted to know if smaller vessels than the Connecticut and the Louisiana, recently authorized, which will each have a displacement of 16,000 tons, would not be quite as effective in the line of battle. This phase of the conference, however, was incidental and resulted in a mere exchange of views.

Another matter brought forward by the president was the tendency of the American naval strategists to advocate the construction of many supply and repair ships to be attached to the fleet in time of war. On this subject the president had decided views. He showed that he believed that it was a mistake to hamper a fighting force by a crowd of non-combatant ships, which would have to be taken care of at all times. Battleships, in the president's opinion, should be able to take care of themselves for a considerable length of time and not be dependent upon auxiliaries that were useless in action and a dead weight on the efficiency of the fighting craft at all times.

While the president is of the opinion that the question of increasing the number of commissioned officers in the navy is of the greatest importance, he evidently does not share the view of most naval officers that it should take precedence at this time of the desire to increase the fleet. Personnel increase and material increase, he thinks, should come together, and it is believed that he will devote his efforts to that end. Admirals Taylor and Bowles took with them to the white house plans of vessels under construction and others about to be contracted for, and these were examined with interest by the president.

Robert Palmer & Son, Noank, Conn., have under construction two car floats, 330-ft. long, for the New York Central & Hudson River railway, a tug boat 100-ft. long for J. H. Van Wie of New York, and a tug boat 98-ft. long for the White Star Towboat Co. of New York. Keel has just been laid for a steam lighter 130-ft. long for the Manhattan Lighterage & Transportation Co. of New York.

A complete catalogue of nearly 300 pages has been issued by the C. O. Bartlett & Snow Co. describing its elevating, conveying and general mill machinery of all kinds. The catalogue is illustrated throughout with wash drawings and photos. This company has made a specialty of labor-saving machinery and is pleased at all times to furnish plans, estimates and complete working drawings to meet any case where expeditious and economical handling of material is required.

FUTURE OF UNITED STATES SHIP BUILDING CO.

Mr. Lewis Nixon, president of the United States Ship Building Co., has given out the following interview regarding the policy and prospects of the new ship building combination:

"We have organized an establishment of such completeness, economy and efficiency that today battleships and cruisers can be built more cheaply here than abroad. With commercial work the problem is altogether different. A man who must do all of his work in the same yard is at a disadvantage. Even ordinary work cannot be done as cheaply or as well. England, with her ship construction amounting to 1,800,000 tons per year, can naturally specialize to a much greater extent than we, with our 30,000 tons, have thus far been able to do. In England when a large tramp steamer is wanted, the work is done at a yard where nothing else is made; likewise, with a palatial ocean liner. With us, owing to the fact that the yards have to live on whatever they can get to do, each yard works on vessels of a great variety of types and is not able to specialize at all.

"A few years ago a large American yard had on the ways at one time a tug, a large ferry boat, a revenue cutter, a yacht and a battleship. No one who knows anything about constructive work will question the statement that under such conditions anything like a satisfactory degree of economy is impossible. Where our yards have confined themselves strictly to commercial work they have been able to build at very low cost. This is proved by the work of the yards of the great lakes, where results have been remarkable.

"This being the case the United States Ship Building Co. did not desire to include all the yards in the country, but merely the number of effective units that would allow the company to put each piece of work in the yard best able to handle it. Often contracts were secured by one yard which some other yard was better equipped to handle. Now a perfect adjustment of ends to means is possible. Our yards on the eastern coast have already begun to specialize.

"With the Bethlehem plant turning out armor, forgings, castings, structural shapes and guns we are able for the first time, under one management, to turn out a complete vessel of war, with armor and armament, ready for battle. We have built several men-of-war, but up to the building of the two for the Mexican government, which are now in the yards, armament for foreign warships has always come from Europe. Inability to make tenders for the building of the complete vessel has always handicapped Americans in bidding for foreign work, but now we are able to make tenders in just the way they are demanded. The Bethlehem plant is now working on a contract for 100 guns for the United States army, ranging up to 12-in. in size.

"Every one of our yards is full of work. The Harlan & Hollingsworth yard, which did not have a ship in it when we took charge, is now full to overflowing and in the car shops there are contracts for $750,000 of work. As for our earnings they need not be calculated altogether on the past. We have contracts for ship construction to the extent of $37,000,000, besides contracts for work in the Bethlehem plant amounting to $13,000,000 or $14,000,000. This is enough to engage the establishment for three years to come. Either branch of the company has enough business on hand to pay by itself all the fixed charges of the company, with a margin over for the stock. But there is sure to be an enormous increase. The government will continue building on a large scale and the world generally is waking up to its needs afloat. The United States Ship Building Co. will make a determined and successful effort to get its share of foreign work. When men built ships of wood and our forests extended to the water's edge we built a large proportion of the world's ships. The conditions of that time are duplicated, for steel, in the production of which we lead the world, is now the material of which ships are built."

The big floating dock which the government purchased from Spain at Havana is being towed from that place to Pensacola. The dock has been cut into two sections, the first of which started last week for the Florida station.

The Pacific Mail Co.'s new steamer Korea arrived at San Francisco recently from Yokohama, breaking the record across the Pacific. The steamer made no stop between the coast of Japan and her home port, making the trip at the average rate of 470 miles a day. From Yokohama by direct line to San Francisco is 4,000 miles. The passage was made in ten days.

The United States Coal Co. is about to equip its soft coal mines at Dillonvale, Jefferson county, O., with electrical machinery and for that purpose recently purchased from the Westinghouse Electric & Mfg. Co. two 150-K. W., 550-volt, direct-current generators and two 10-ton mining locomotives. Electric power will be used for the operation of the locomotives and other mining machinery.

The American liner Kensington, which reached New York from Antwerp last week, used oil instead of coal for fuel under one boiler during the trip, being the first passenger vessel to cross the ocean using oil even as partial fuel. John Carnegie, chief engineer, and Edward Wright, the superintendent of the American Line, hurried aboard as soon as the Kensington docked and after a long conference announced that the experiment had been a success. Comparative statements will probably be made public at a later date.